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ANTARCTIC PELAGIC WHALING*

THE RÔLE OF THE VETERINARY SURGEON IN THE WHALING INDUSTRY, WITH SPECIAL REFERENCE TO STANDARDS OF INSPECTION IN THE PRODUCTION OF WHALEMEAT FOR HUMAN CONSUMPTION, AND SOME NOTES ON THE PATHOLOGY OF THE BALEEN WHALES.

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ANTARCTIC WHALING EXPEDITION, 1948 TO 1949

INTRODUCTION

The observations which comprise this paper emanate from a whaling season in Antarctic regions with the floating factory S.S. *Southern Venturer* (Messrs. Chr. Salvesen, Leith) and its attendant fleet. This was one of the two expeditions engaged in the production of whalemeat, intended for human consumption in Britain, during the 1948 to 1949 season, and it was the first occasion on which this company had been concerned with meat production.

In order to comply with the newly formulated regulations governing the importation of whalemeat into the United Kingdom the expedition included in its personnel a veterinary surgeon, who was accompanied by two meat inspectors.

It fell to the veterinary surgeon to plan and co-ordinate a method and routine of examination, and to establish workable standards of whalemeat inspection. A complete knowledge of the entire operation of whaling was therefore necessary, and all the phases of the hunt and struggle, the treatment and processing of the carcase had to be studied at first hand.

The science of whalemeat inspection is a young one. New standards had to be formulated and an effective routine of inspection evolved. The information hitherto available has related to the activities of one company alone (S.S. *Balaena*—United Whalers Ltd.). Methods and conditions pertaining on *Southern Venturer* differ considerably from those previously described. No laboratory facilities were available, and the findings of this paper are based solely on detailed observation on board the floating factory and on the auxiliary vessels of the fleet.

In spite of the fact that whaling has been a notable industry for many years the published knowledge is remarkable for its paucity and, in many cases, for its unreliability from a scientific aspect. The reports of the Discovery Committee, and the "Hvalradets Skrifter" stand alone in their respective spheres, while within recent times the bacteriology and chemistry of whalemeat have been investigated by the scientific staff of the Low Temperature Research Station at Cambridge, whose teams have accompanied the *Balaena* expeditions. Whalemeat inspection *per se* has, however, received little or no attention.

The scope of this paper, therefore, is:—

1. To describe in outline the operation of whaling, in order that the problems of meat production may be fully appreciated.

2. To present a survey of the general conditions involved in obtaining whalemeat intended for human consumption.

3. To list the original observations of the author which may form a foundation for whalemeat inspection in future years.

The whale being a mammal, and by far the largest creature in existence, it is submitted that, as a source of edible fat, and of protein as meat, during any time of world shortage, many matters pertaining to the acquisition of these products fall within the purlieus of veterinary science.

It is necessary at the outset to emphasise that the production of whale oil is the basis of the industry. It is of supreme importance and the acquisition of the various by-products is subservient to it. Of these by-products frozen whalemeat, as the most recent addition, is regarded at present as being among the least important from the commercial viewpoint. Imported whalemeat has suffered in previous years by the lack of standards of selection, and by inept methods of collection and handling which have resulted in the marketing of an inferior product.

The difficulties are many but they are by no means insuperable. The divergence between conditions on *Balaena* and those on *Southern Venturer* is very wide. The problems of whalemeat production are complex, and the need must be stressed for increased research and skilled observation on the many points which are at present matters of conjecture.

PART I.

1. WHALES

Whales are warm-blooded, air-breathing, marine mammals. They are viviparous and the young are suckled from twin mammary glands situated one on either side of the vulva.

They fall into the two sub-orders, toothed and untoothed.

The untoothed or Baleen whales (Mystacoceti), commonly found in southern waters, include the Blue, the Fin, the Sei, the Minke and the Humpback. The Blue is the most sought-after since it is the biggest of all the whales. The smaller Fin is more plentiful and is taken in large numbers. The Humpback is a valuable source of oil but has been so rigorously hunted that it became threatened with total extinction, and has been protected for a number of years. Very few Humpbacks were observed this season by the

* This paper is an abbreviated version of the more comprehensive thesis successfully submitted by the author for the Fellowship Diploma of the Royal College of Veterinary Surgeons. It was presented to the meeting of the North Wales Division, N.V.M.A. held at Bettws-y-Coed on September 22nd, 1950, and that of the South Wales Division at Carmarthen on December 15th, 1950.

gunners but the species is believed to be on the increase, and it may soon be the turn of the Blue for a period of protection. A few Sei whales were taken towards the end of the season, but both the Sei and the Minke are too small to be of any great value in oil production and are generally ignored in favour of the Blue and Fin whales.

In place of teeth the Baleen whales have, as an appendage to the hard palate and lining the upper jaws, the baleen plates. These are termed "whalebone," erroneously, since they are non-skeletal and consist of a horny substance frayed at the outer edges into long hairs which form a sieve or filter, causing the shrimp-like "krill," on which these mammals feed, to be retained in the mouth while the water is expelled between the plates.

Of the toothed whales (Odontoceti), the commonest are the Sperm and the Killer. The ubiquitous Killer whale is a voracious, scavenging and cunning creature. It is not large enough to be of value for oil production, but numbers of them are shot from the stern of the factory as they come in to attack the tethered carcases.

The Sperm whale has a very narrow lower jaw which carries a single row of sharp teeth. There are opposing sockets in the hard palate. The teeth are utilised as a by-product and are sold as a form of ivory.

Prior to the commencement of, and during, the Baleen season a large number of Sperm whales were taken by the expedition. They do not enjoy the measure of protection extended to Baleen whales. In southern waters the Sperm whales are of an average length of 50 feet and are, without exception, of the male sex. The female is unknown in the Antarctic whaling grounds.

The flesh of the Sperm whale is jet black, a coloration which may be due, at least in part, to the type of feeding material, since the ingesta invariably consist of cuttlefish. These are frequently found entire, or almost so, in the stomach, usually with the sepia sac intact.

The repulsive appearance of the musculature accounts for the fact that the collection of Sperm whalemeat for freezing was never considered. Its value as a source of food is doubtful but it might be remarked that in former times it was a staple diet on the American whaling ships. Its use for animal food is possible, but it is doubtful if the process of freezing meat intended for this purpose is an economical proposition.

Of the Baleen whales the principal species taken are the Blue and the Fin. The flesh of the Blue, Fin and Sei whales is suitable for human consumption. The difference between them is of texture and oil content rather than of appearance and flavour.

2. Regulations

Southern Venturer flies the British flag and is bound by the following Acts, Orders and Regulations, which are designed to give effect to the International Convention for the Regulation of Whaling:—

The Whaling Industry (Regulation) Acts of 1934 and 1938. The Whaling Industry (Ship) Regulations, 1947. The Whaling Industry (Sperm Whales) Order, 1937 (a).

These provide for the protection of certain species of whales absolutely, the fixing of a close season, and the total prohibition of hunting in certain areas. Minimum lengths are stipulated for each species and no female whale may be killed which is accompanied by a calf. Floating factories must make the fullest possible use of each whale carcase, and whales may not be killed in greater numbers than the factory can cope with in a reasonable time.

Broadly speaking, the legislation is designed to prevent the wholesale and indiscriminate slaughter of whales and to conserve existing stocks. Each factory vessel is required to carry two whale fishery inspectors whose position is that of observers only. Their primary duty is to ensure, so far as is practicable, that the conditions under which the licences are issued are observed. Any breach of the regulations is reported by them to the manager of the expedition, and it is their duty to record the action taken and to report at a later date to the Ministry of Agriculture and Fisheries.

The duties of whale fishery inspector can be undertaken, as during the 1948 to 1949 season, by the veterinary surgeon who, with certain limitations, is in a position to function adequately in both inspectorate capacities.

The Ministry of Food has issued a Code of Rules relating to the production of whalemeat and whalemeat products intended for human consumption. This document is analogous to Memo. No. 62 (Foods) and provides for the inclusion of a meat inspection team in charge of a veterinary surgeon, in each expedition engaged in the production of whalemeat intended for human consumption in this country. In many respects the Code is of a tentative nature but it very rightly puts a great deal of responsibility on to the shoulders of the veterinary surgeon and permits him to exercise his discretion in a wide field.

3. Method of Operation of the Whaling Fleet

The fleet with which this paper deals consists of the floating factory *Southern Venturer*, its catchers and buoy-boats, its corvettes, the refrigerating ship, the meat ferry boat, and numerous transports whose function is to bring fuel to the parent vessel and to take away the whale oil.

The factory is among the most modern of those operating at the present time, and is certainly the most efficient judged from the yield of oil obtained per whale.

The personnel is, in the main, of British and Norwegian nationality; Norwegians predominate on the whaleboats or catchers, and the dominant influence in the expedition is Norwegian.

The company's whaling station at Leith Harbour, on the island of South Georgia in the Southern Atlantic Ocean, is regarded as the base of operations for the *Southern Venturer* expedition, but it is also an operative land station with its own fleet of catchers, full factory equipment and machinery, and storage tanks for fuel and whale oil. It is occupied throughout the entire year: its whaling season lasts for six months and during the southern winter the catchers are laid up there and such repairs as may be necessary are carried out by staff living ashore.

The Baleen season commenced at midnight on December 15th, 1948, but prior to that date there was a fortnight of Sperm fishing which served the double purpose of providing a good yield of the valuable Sperm oil and of getting the deck and factory crews fully trained and at maximum efficiency prior to the commencement of the Baleen fishing season.

Eight catchers operated from the floating factory during the season. These are small fast craft, very manoeuvrable, carrying a crew of 12 to 17 men and having a speed of between 12 and 16 knots according to class. They return to the factory at intervals of about four days for refuelling, as well as on the occasions when they deliver their catch. The master of the catcher is also the gunner; theirs is an hereditary occupation, and the gunners are, without exception, Norwegians.

The "fangstleder," or leading gunner, operates from a fast modern catcher and his primary duty is to scout for the fleet; to find whales and notify their position to the other catchers.

In addition to the fleet of catchers there are two buoyboats which are at the disposal and under the orders of the factory manager, who in this case is also the master of the floating factory. The buoyboat captains are usually first- or second-season gunners: men who, having worked their way up from deck-hands and being also the sons of gunners, are serving a probationary period prior to being promoted to command of catchers. The buoyboats act intermittently as catchers ; as tugboats, collecting flagged whales at sea and delivering them to the factory ; and as holding units for whales which, during busy periods, may be too numerous to be attached to the stern of the factory in the usual manner. They also search for lost whales, and pick up those whose tails have become severed during towage.

A new departure is the acquisition of two corvettes which have operated most successfully as tugboats, collecting whales either directly from the catchers or after they have been flagged and set adrift. The catchers are thus free to hunt during the major part of their time at sea, and there is no wastage of time for them in picking up and delivering their flagged whales.

The refrigerating ship *Southern Raven* kept as near to the factory as circumstances permitted, and usually lay about a mile off while whales were being worked up. Not infrequently, however, ice conditions, for which she is unfitted, forced her to lie farther off and this extended the period during which meat was in transit.

The meat ferry boat *Sabra* is an old catcher converted for the purpose by having the gun platform, whaling winch, mast and gangway removed, and a meat pound erected on her foredeck. She was available day and night to transfer meat to *Raven* to the best of her capabilities which were severely limited in bad weather.

Numerous tankers called at Leith Harbour during the season to unload fuel and load whale oil, while one ship made regular journeys between the factory and the island for the same purpose. The floating factory remained at sea for the entire season and returned to Leith Harbour on March 30th, 1949.

4. The Hunt and Kill

All catchers are equipped with radio, radio-telephone and radar, and several are fitted with an Asdic apparatus specially adapted for the locating of whales. Opinions on the value of Asdic vary, but most of the gunners, with typical conservatism, are opposed to its use on the doubtful grounds that the submerged whale can hear the echo-inducing sound from a distance and will take fright and be off before the catcher can establish contact. In such cases a whale will not make frequent changes of direction in the usual manner.

It has been estimated that a Blue whale can attain a speed of 20 knots, and a Fin approximately 16. A whale travelling on a constant course can leave the slower catchers well astern ; this, however, happens but seldom. In general the pursued whale zigzags and the true skill of the gunner lies in judging the site at which it will surface when he is close enough to fire the harpoon. The sighting device on the gun is primitive and the target is large. As a rule the catcher is so close when the gun is fired that it would appear to be impossible to miss. Nevertheless misses or "booms" are made with surprising frequency even by the most expert of gunners.

The whale hunt begins at sunrise and lasts until nightfall, the best time being with the first light of day when the whales are together in small groups or schools. When feeding, they mill around in the water within a small area corresponding to the krill patch, the presence of which is often indicated by clouds of sea birds. Later in the day the schools have been split up over a wide area, and the individual whales take fright easily and are difficult to approach. When one whale out of a school has been killed the behaviour of the rest becomes erratic and unpredictable. They are then known as "fox" whales: one which exhibits the extreme form of "foxiness," possibly as the result of previous wounding, which will often double back towards the catcher during the hunt or struggle, and which may baffle the gunner completely, is known as a "crazy" or "wild" whale. These whales are a source of considerable danger since the whale line may foul the catcher's propeller.

Whales are located by the look-out man in the crow's nest. In clear weather the "blaast" can be seen for a considerable distance. This is the spout of vapour which shoots up into the air from the twin expanding blow-holes on top of the curvature of the head as the huge, streamlined body curves gracefully over in the water. As the catcher approaches, the very typical expiratory sound made by the whale as it blows is heard.

The catcher heads for the school, which generally consists of up to three Blue whales, or five to eight Fins. The gunner leaves the bridge and makes his way down the gangway on the starboard side to the gun platform. He selects his whale and the hunt commences, the gunner shouting directions or giving hand signals to the helmsman. The hunt may last any length of time from 20 minutes to several hours. Each time the whale sounds he leaves a slick or "vorvler," a smooth patch on the surface of the water which is a guide to alterations of course.

The Sperm whale can remain submerged for more than an hour ; the Baleen whales for approximately 15 minutes. These periods shorten as the hunt progresses.

When the catcher is within shooting distance, and this may be no more than five fathoms, the engines are stopped: if the gunner's judgment has been correct and the whale surfaces at the expected spot, the gun is quickly sighted and fired.

The harpoon has four hinged prongs or grapples, which open and prevent its withdrawal when the line takes the strain. The head is fitted with an explosive grenade having a three-second-delay time-fuse which detonates on entering the body. The charge is a large one of ordinary black powder and the damage caused by the shrapnel is very widespread. A second, or "killer" harpoon is commonly fired as a precaution, but it is not unusual for four or even five harpoons to be necessary before the whale is killed. On the rare occasions when the harpoon enters the head death is instantaneous: in this case, however, the whale is liable to sink rapidly and may be lost through breakage of the line. The ideal site is below and slightly posterior to the pectoral fin ; the harpoon then enters the thoracic cavity which rapidly fills with blood due to the resultant heavy internal bleeding, and death quickly ensues. The commonest site for harpoons, however, is the back and here the damage to the Longissimus dorsi and Psoas muscle groups is often so extensive that one or two fillets may be completely wrecked.

The line attached to the harpoon is made of nylon, and is very strong, thin and light. It is known as the "førloper" ; to it is spliced the "førhaandsline," a heavier manilla rope, which is spliced in turn to the "førstelinken." This is the whale-line proper. It is a thick and heavy hemp rope existing in several links. The førloper is coiled on the gunner's platform and goes out very rapidly when the harpoon leaves the gun. The line runs

W. ROSS COCKRILL : Antarctic Pelagic Whaling

Selection from a series of photographs taken during the 1948-49 whaling season and designed to illustrate the various phases in the production of whalemeat intended for human consumption as described in the accompanying paper.

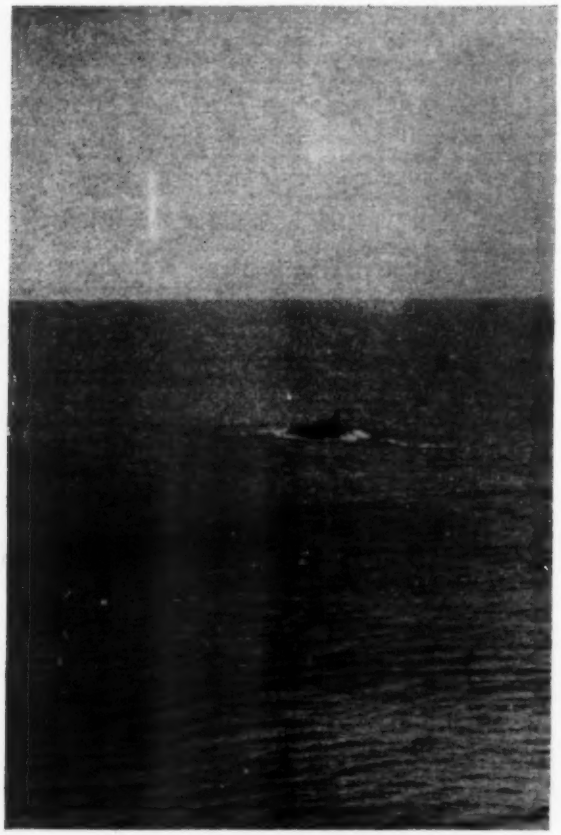

FIG. 1.—The hunt : a Fin Whale is singled out.

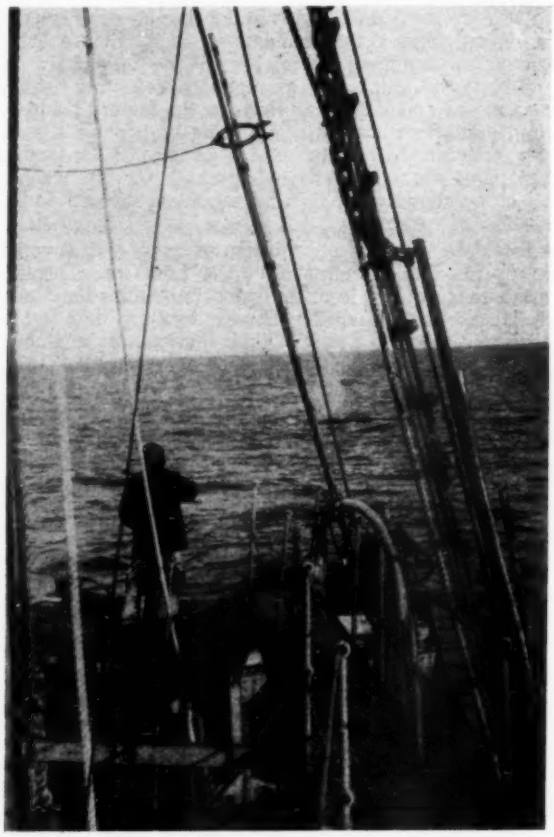

FIG. 2.—The gunner prepares to fire the harpoon gun.

FIG. 3.—The harpoon strikes home in the Longissimus Dorsi muscle, dorsal and posterior to the right pectoral fin. In this photograph the expanded nostrils or "blow holes" can be clearly seen. The whale is in the act of inspiration prior to sounding. Note the nylon førloper.

FIG. 4.—The end of the struggle: the exhausted whale, weakened by loss of blood and a struggle which in this case has lasted for 50 minutes, is pulled alongside the catcher. Only one harpoon has been necessary here, but it is not unusual for at least five to be required during a death struggle of three hours or more. Note the sighting device on the harpoon gun.

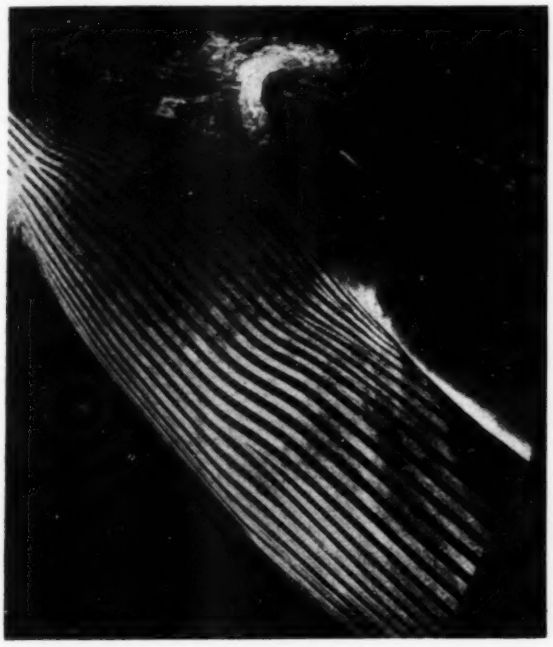

Fig. 5.—Head of Fin whale under bow rail of catcher. The eye and the external auditory meatus can be seen. The site of incision for bleeding from the jugular vein is marked.

Fig. 6.—The whale is inflated alongside the catcher. The air-pump line is seen in the top right-hand corner.

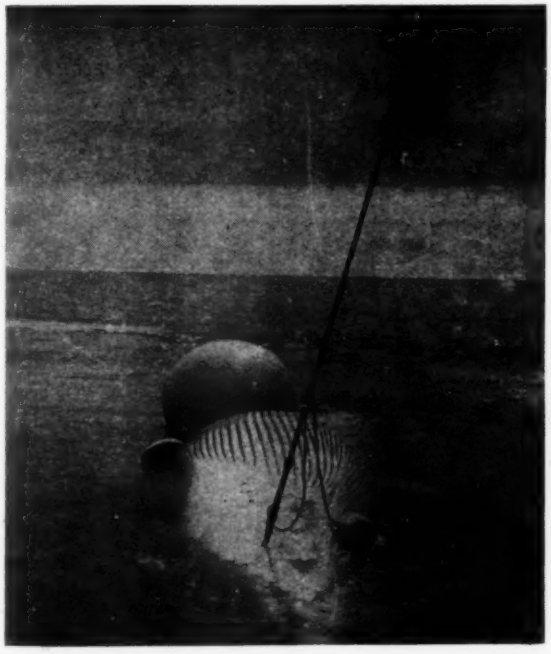

Fig. 7.—Inflated and flagged whale set adrift by catcher to be taken in tow later or picked up by corvette. During inflation the air works forward under the blubber to the loose inter-mandibular tissue which everts from the mouth as a huge balloon.

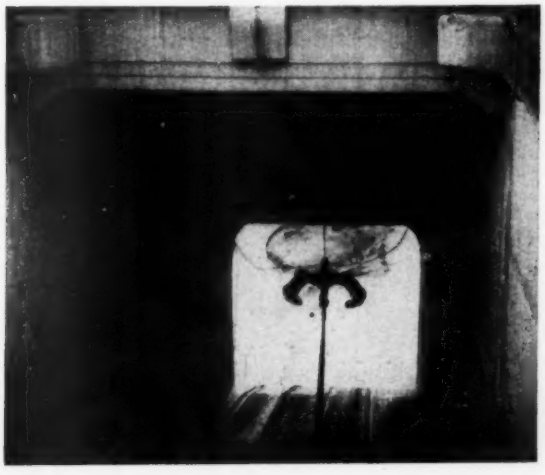

Fig. 8.—The open stern leading to the slipway, up which carcases are dragged to the flensing deck. The grab or "claws" being manoeuvred into position to grapple the tail of a whale.

Fig. 9.—Looking forward up the slipway. A Blue whale is dragged tail first on to the flensing deck.

Fig. 10.—Removing a fillet of meat by derrick line.

Fig 11.—On the meat deck of the freezer ship. The fillets are cut into large pieces weighing about 1 cwt. The meat is then graded prior to being cut into smaller blocks and frozen.

Fig. 12.—Lemming deck: one side of the chest cavity is lifted up by derrick line.

back over the bow-rails, down to the foot blocks and upwards to the blocks on the mast which are suspended on very powerful springs. From these blocks the line runs down to the whaling winch by means of which the whale is "played" during the struggle, and thence through a narrow pipe, fitted with a braking device, to the "line bingen," the small hold where the links are coiled. The weight of the whale—usually well over 100 tons—is taken through the ingenious system of blocks and springs at the mast head.

The hunt and the struggle combine to produce the fatigue factor which affects the quality of the meat from the carcase. The death struggle may last for some hours, but in the experience of the author of this paper the commonest length of duration of struggle is in the region of 40 minutes. During this period the expenditure of energy is enormous. The wounded whale dives deeply, zigzagging powerfully under water. As he surfaces, his tail is seen to be in violent motion; the body curves and arches and the whale sounds repeatedly, losing blood the while. Gradually he tires and comes to the surface more frequently. As the ultimate stage of exhaustion is reached, the winch begins to reel in and the whale is brought up under the bows of the catcher.

The method of killing by explosive-head harpoon is inhuman, wasteful and archaic. Often a harpoon will pass clean through the body. The damage caused is always extensive. No attempt is made to utilise the minimum propellant and grenade charges. Experiments with the electric harpoon have not been made by this expedition. It would be difficult to break down the prejudice against new methods—a prejudice based on fear of simplification—but it is obvious that the more rapidly death can be brought about, the better will be the quality of the meat obtained.

The potentialities of the electric harpoon are very great. It offers the possibility of instantaneous death, the elimination of the prolonged death struggle with consequent saving of time, and a great reduction in the amount of tissue destruction.

The extreme degree of wetness, the unpredictable nature of the onset of rigor mortis and the rapid degeneration of the texture of the meat, all of which can be observed daily on the plan, may well be due to the complete fatigue of the musculature which, in many cases, exists at the time of death.

The meat taken for freezing consists of:—

(a) The two Longissimus dorsi muscles (the "Epiaxial Muscle Complex" of Parry), which comprise the upper or back fillets.

(b) The two Psoas muscles (the "Hypoaxial Muscles" of Parry), which are the under or belly fillets.

The former provide for elevation of the tail flukes, and the latter for their depression. They are thus responsible respectively (a) for the motive power of the dive and for the violent flexion of the body during the death struggle: and (b) for the less strenuous depression of the tail during surfacing, which is aided by controlled buoyancy, and for the extension of the body in the final struggle.

The Longissimus dorsi muscles may thus be expected to suffer a greater degree of fatigue than the Psoas group, and in fact it is frequently found during the routine of meat examination on the plan that the condition and quality of the under fillets are superior to those of the exhausted back or upper fillets.

Post-mortem findings indicate that drowning is the immediate cause of death in the majority of cases. Invariably, one lung, at least, is found to be waterlogged.

The assumptions that extreme fatigue immediately prior to death, and death by suffocation, will separately and collectively result in inadequate *post-mortem* bleeding; and that high blood content of the musculature will reduce the durability of the meat, appear to be justified since there is no reason to regard the whale as being different from other animals in these respects. The rapidity with which whalemeat degenerates is, it is submitted, due to these causes in combination with the very slow rate of *post-mortem* loss of body heat from the enormous bulk of musculature.

(5) *Post-mortem* Treatment of the Whale Carcase

Inflation of the whale carcase to render it buoyant, and thus to reduce the risk of loss by sinkage, is carried out as soon as the whale is brought in under the bows of the catcher. Bleeding and slitting cannot be carried out from the gunner's platform at this stage.

A spear-pointed hollow rod, pierced by numerous holes in its 2-foot length and to which is attached a rubber tube, is affixed to one end of a long pole and plunged through the skin and blubber. Compressed air from a small motor-pump is then pumped into the carcase. The use of exhaust gases, at one time common, has long been discontinued owing to the resultant rapid degeneration. The inflation tube has never been observed by the author to penetrate directly into either the thoracic or abdominal cavity, though this has been presumed by many writers. The air diffuses between the blubber and the musculature and tends to work forward towards the head, until it reaches the mass of loose fibro-muscular and areolar tissue in the posterior part of the intermandibular space. This tissue inflates and becomes everted from the mouth as a huge balloon. It is commonly and erroneously referred to as the tongue. In life its function is to expel water through the baleen plates which act as a filter, retaining in the mouth the small shrimp-like krill on which the Baleen whale feeds.

The tail is lassoed and made fast by means of a steel rope called the tail strop. It is drawn up to the side of the catcher and in order to render it more manageable the extremities of the large tail flukes are cut away. At the same time the identifying marks of the catcher are notched on what remains of the flukes. The førloper is then severed, the catcher proceeds ahead and the whale floats into position at its side. Usually, but not invariably, it is now in a suitable position to be bled. Occasionally neither jugular vein can be reached from the side of the catcher and in such cases no satisfactory alternative method of bleeding has yet been discovered.

Bleeding was introduced only in the face of a great deal of opposition both from the gunners and from the factory manager. Their objections to it were twofold, for they resented the loss of time involved and feared the probable escape of air from the incision with consequent loss of buoyancy and danger of sinkage. These objections were overruled—not without misgivings—and a number of demonstrations were given by the author. As a degree of expertise was attained the objections were proved to be invalid.

The site of the jugular vein in the Blue whale is anterior to the point of the shoulder and it can readily be severed by incising 12 inches in front of the point of the shoulder at right angles to a line passing medially through the pectoral fin. The "rifler," or ventral skin grooves, form a fairly reliable guide to the correct site, the point for incision being the anterior terminations of the three dorsal grooves. The cut must be at least 24 inches deep but need be no more than 12 inches long.

The flensing knife, which is shaped like a hockey stick and is the instrument in common use for all the tasks involved in dealing with the carcase, is of little use for bleeding. Its use turns a simple operation into a major undertaking and in few cases is efficient bleeding obtained. A special bleeding knife was, therefore, designed by the author and in practice it proved to be ideal for the purpose. It has a flat, diamond-shaped blade, 12 inches long and 5 inches across at its greatest width. It has four cutting edges for greater ease in incising deeply and extracting, and is mounted on a 12-foot pole. The ship's blacksmith made a number of these instruments and one was supplied to each catcher. With practice it is possible to sever the jugular vein in under 20 seconds, and once this was established several of the gunners made it a routine procedure.

There is ordinarily a substantial loss of blood from the harpoon wounds either externally or into the body cavities. The volume of blood in a whale is very great—it has been calculated that the weight of blood in an 89-foot Blue whale was 8,000 kg. and this would appear to be an underestimation—and however much may be lost from wounds more will always gush from the severed jugular. Bleeding is most effective when carried out immediately the whale is brought alongside the catcher, but the loss of blood will be considerable at any time. The rate of coagulation of blood in the body appears to be very slow, and the agitation and constant massage effect undergone by the carcase during towing forces blood out from the jugular incision in a constant stream. Whales have been observed during lengthy periods of towage which have still been losing blood in appreciable amount at periods of upwards of ten hours *post mortem*.

After a whale has been killed, marked and inflated it may be set adrift while the hunt is resumed, to be picked up later either by the catcher or by a buoyboat or corvette notified by radio of its position. A floating whale tends to move into the wind and may drift for a considerable distance. In order to make its discovery easier the whale is flagged, a long bamboo pole with a sharp metal spike being thrust into the blubber. The pole carries a red and white flag bearing the identifying number of the catcher and is equipped with a lamp and battery to enable it to be located during the hours of darkness.

The circumstances of towage vary greatly. Towage for a long distance, or in rough weather, or through drift ice, adversely influences the quality of the meat. The buffeting received by the carcase is forceful and continuous, particularly when two or more whales are in tow together, and the normal process of rigor mortis is prevented by the constant movement, massage effect and "passive exercising" of the musculature. By detailed observation on the factory decks, and correlation of *post-mortem* findings to the distance and speed of towage it might be possible to fix a radius of operations around the factory vessel, beyond which it would be known that no whales need be considered for meat production.

(6) Deck Operations

The inflated whales are delivered to the stern of the floating factory by corvette, catcher or buoyboat, and the end of the steel rope or tail strop is transferred to the factory. The whales remain floating at the stern until they are pulled up the slipway and on to the after-deck or flensing plan. It may be mentioned at this stage that meat whales must be given priority, not only in collection and delivery, but to enable them to "jump the queue" of older whales at the stern.

The whale is manoeuvred tail first into the slipway by means of winches. An ingenious appliance working on the scissors principle and known as the "claws" is lifted and manipulated by two powerful winches and is dropped over the tail, which it grips securely, locking firmly in place. The massive carcase is then towed up the incline of the slipway by lines from the main winches on the middle winch platform, and on to the after-deck plan where it lies on hard wood planking between the canting chocks. Here the whale is measured and recorded.

The flensers get to work while the carcase is being hauled up the slipway and with the long-handled, curved flensing knives the preliminary cuts are made in the blubber which is then peeled off in large strips, each of which is secured by a toggle or chain to a derrick-line. This process is hastened by a flenser who separates the thick blubber from the underlying tissue. By the ease with which parts of the blubber are thus separated it is occasionally possible to judge the site and degree of inflation.

A hook is attached to the lower jaw which is torn free by a winch-line, disarticulation being assisted by the flensers. The entire jaw is pulled forward to the port bone-saw on the forward plan, where it is cut up and hooked down through the open manholes into the factory boilers.

The whale is turned over between the canting chocks by winch-lines and the blubber is removed from back and belly. Two long strips of tissue in which are embedded the baleen plates, and which include most of the hard palate, are removed from the upper jaw. These are cut free one at a time by a flenser while a line from the after-derrick pulls them upwards. When freed the strips are swung outboard and dropped into the sea.

A steel rope from the main forward winch is attached to the tail and the carcase is drawn through the arch under the main winch platform to the forward-deck plan. (This archway is appropriately known as "Hell's Gate.") The head is disarticulated at the atlanto-occipital joint and pulled across to one of the starboard bone-saws to be cut up.

The carcase is now lying on its belly. The upper fillets, when not required for freezing, are removed and dragged forward to the "Rosedown" plant where they are hacked up by the cutters and fed into the rotary knives. The ribs are severed by a hook-shaped knife attached to a winch-line and the complete "side" is hoisted into the air by a derrick and suspended over a manhole leading to a bone boiler. The ribs are then cut off singly from below with flensing knives, and as they are removed the side is gradually lowered until its disposal is complete. In the meantime the tail is severed, the under fillets removed and the spine sawn up by the bone-saws. The remaining side and the viscera are dragged right forward. The heart, lungs and kidneys go down a manhole to the meat-meal plant: the liver is pulled aft to the liver-plant cutter on the port side; the remaining side is hauled by winch-line over the top of the pile of entrails, and then aft by derrick to "Hell's Gate." The intestines are dumped overboard on the port side forward.

A Blue whale can be dealt with completely in 40 minutes, while the lighter and more easily manageable Fin takes about half an hour.

The work on the floating factory is continuous. In a good season very few, if any, quiet spells are experienced. The men operate in shifts of 12 hours' duration, commencing at 6 a.m. and 6 p.m. The work both on and below decks is extremely arduous: working conditions are bad, and physical and mental breakdowns are not uncommon.

(7) Procedure for the Removal of Meat for Freezing

The elevated meat deck was too small to be of any use other than as a place of temporary stowage for fillets until the ferry boat came alongside. Inspection, therefore, was carried out on the after plan where the work of the meat inspectors was always difficult and sometimes dangerous.

The meat inspector notes the species, sex, length and time of kill as the carcase reaches the plan. As soon as the blubber has been removed he checks the temperature of the meat on the carcase. Several large incisions are made across the fillet and the meat is examined for appearance, colour, texture and condition. If satisfactory the fillet—omitting any portion damaged by the harpoon grenade—is trimmed off by a flenser under the meat inspector's supervision, and is hoisted by derrick to the meat deck, on the starboard side. During the process of removal the underside of the fillet is examined.

The approximate weight of the fillets is as follows:—

	Back fillet	*Under fillet*
Blue whale	3 to 4 tons	2½ to 3½ tons
Fin whale	2 to 3 tons	1½ to 2½ tons

By the use of one or two strops the fillet is lifted clear from the carcase but no method has been devised by which contact with the deck is avoided. The contact is brief and takes place as the strops are attached, the ends of the fillet trailing in the contaminated material which lies thick on the deck.

The false deck, which is laid prior to the opening of the season, consists of soft wood planking, with the exception of the area between the canting chocks where planks of seasoned oak are used. The soft wood is subjected to rough usage and very early in the season it becomes scored and pitted, and is soaked in blood and filth.

The decks are always very slippery. They are crossed by winch-lines, obscured by clouds of steam, and there are many large open manholes leading to the boilers. As a measure of safety and for increased efficiency the men working on deck wear heavy leather knee-boots carrying spiked heel plates, which add notably to the wear and tear of the sodden planking.

(8) Hygiene

Hygienic measures of any sort on a floating factory are inevitably bound to be inadequate, and having regard to the nature of the operations must amount to little more than a token performance.

One of the many revolting features of whaling is the taking of dauhvaler. A "dauhval" is defined by International Convention as being "any unclaimed dead whale found floating." They are generally whales which have been harpooned but which have escaped when the line has broken, and which have been able to get away from the pursuing catcher. Of the eleven dauhvaler handled during the season harpoons were present in every case, and none of these whales had died from natural causes.

The contamination of the soft wood planking which takes place during the flensing of a dauhval is very extensive. The deck becomes covered with an evil-smelling, semi-liquid material and the cleansing which follows consists merely of hosing with sea water and sweeping the deck surface.

Routine hygienic measures are however rigidly enforced on the meat deck, on the ferry boat and on the refrigerating vessel. After transhipment the fillets are immediately trimmed all over to a depth of ½ inch, and these outer contaminated trimmings are discarded.

PART II

Method and Routine of Inspection

The inspection of whalemeat bears little resemblance to normal abattoir routine. The main causes of rejection of meat are putrefaction and harpoon damage. Clinically the disease picture, though interesting, appears to be of little relative importance.

In view of the rapid degeneration of the musculature the meat must be subjected to inspection at all stages until it enters the freezing units. Once the meat has been removed from the carcase speed in processing is essential, and it is most desirable that it should be frozen on the factory vessel. Meat suffers from the time lag and the additional handling involved in transhipment.

(1) *Time Limit.*—The availability of information on the time *post mortem* is an extremely useful factor in whalemeat inspection. It is possible, and indeed it has frequently been necessary, to conduct the routine of inspection without this information. The fact remains that it is a valuable guide to the meat inspector and with it at his disposal the efficiency and speed of inspection are favourably influenced. Of all the points taken into account in judging the fitness or otherwise of whalemeat this is the only one for which the inspector relies on information the source of which is beyond his own skill and powers of observation.

It has been found in practice that all whales considered suitable are under 15 hours *post mortem*. The great majority fall within the ten-hour period. Few whales of over this time limit are suitable, while the number under ten hours *post mortem* which were rejected was small. In general those approaching ten hours *post mortem* have passed through rigor mortis, the meat is wet and the degenerative processes are accelerating rapidly.

Meat was classified in two main grades. Grade "A" meat was either ante-rigor or actually in rigor, and subject to texture, oil content and appearance being satisfactory it was considered to be butcher grade meat.

Grade "M" meat was usually post-rigor and exhibiting the wetness which is a characteristic of such meat.

The number of harpoons in a whale carcase gives a rough guide to the duration of the death struggle. The more extended the struggle the more harpoons will be used, and correspondingly the number of harpoons required to bring about death will have a relationship to the degree of somatic exhaustion. This hypothesis can be submitted only with reservations, since exhaustion, due to a lengthy hunt, may be approached before the first harpoon is fired, and in such cases only one harpoon may be necessary, and death will ensue after a relatively brief struggle. A further complication arises from the fact that it is extremely difficult in the conditions pertaining on the plans to make an accurate count of the harpoons in each carcase. Nevertheless, the observed average harpoonage was slightly higher in the whales from which the lower grade of meat was obtained.

Other factors in addition to wetness are taken into consideration in grade assessment. Grade "A" meat is dry, tender, close-textured, and of attractive and compact appearance. "M" grades may be wet, oily, coarse or tendonous, and are frequently loose-grained, badly bled and unattractive in appearance.

The butchering of meat is a point of major importance where a Grade "A" product is being considered. It is not sufficient that Grade "A" meat should merely be of superior quality in bulk to Grade "M." Little attention has been paid to the production of frozen blocks which could later be cut into single steaks of the required size. At present lumps of meat of all sizes and shapes are packed indiscrimi-

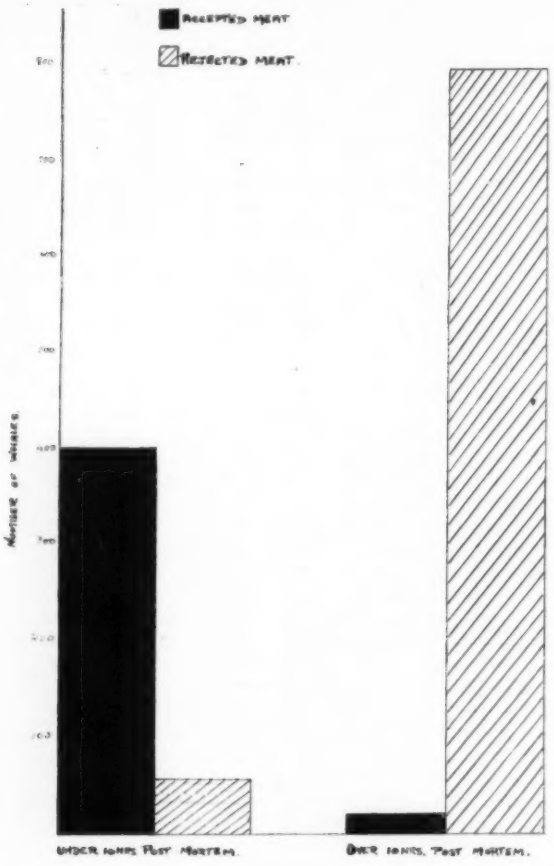

Fig. 1.—Relation of time *post mortem* to whalemeat accepted and rejected for human consumption.

nately into the containers for freezing and the resultant product, however good the quality of the meat may have been, can scarcely conform to the idea of high-grade, butcher-quality whale steak.

The author believes that the best results are to be achieved by quick-freezing prior to the onset of rigor mortis. It is, however, considered that the amount of trouble involved to produce a comparatively small quantity of butcher meat is uneconomic. The prejudice existing in this country against whalemeat—a prejudice resulting mainly from the marketing of an inferior product in the past—will require to be overcome by the production of a Grade "A" whale steak of uniform excellence, a process which will take considerable time. One tends not so much to cultivate a taste for whalemeat as to acquire a distaste for it. It appears that the future of whalemeat as a marketable product in Britain may well lie solely in its value as manufacturing quality, and as a constituent of prepared products.

It is worthy of note that the average *post mortem* time of whales passed as fit for human consumption is very nearly the same for both "A" and "M" grades—6 hours 22½ minutes for Grade "A": 6 hours 20 minutes for Grade "M." This fact would appear to support the writer's contention that the reason for the early appearance of wetness lies in the immediately *ante-mortem* behaviour of the whale and its subsequent treatment prior to arrival on the flensing deck, *i.e.*, in the hunt, struggle and towage factors.

Where the hunt is of short duration, the death struggle brief, and the towage attenuated and gentle, it is believed that the meat will invariably be dry.

Of 164 whales graded "A" on the flensing deck, 68 were killed in the morning, and 96 in the afternoon or early evening. Whales killed a.m. usually take longer to reach the factory since they are likely to be flagged and left drifting for some hours. The majority of Grade "A" fillets therefore, as might be expected, came from those whales killed later in the day and which were either towed directly to the factory, or transferred to a corvette and delivered at, or soon after, dusk.

(2) *Species.*—The judgment of the meat inspector should not be influenced by the species of Baleen whale with which he is dealing. Many more Fin than Blue whales are dealt with during the season and the over-all impression gained is that Fin meat is closer textured and of better quality than Blue.

Approximately 35 per cent. of all Blue whales passed as fit for human consumption were graded "A," while the corresponding figure for Fin whales is 46 per cent.

There is no evidence that the onset of putrefaction, other factors being equal, is more rapid in one species than in the other.

(3) *Sex, Age and Length.*—These factors are not believed to have any relation to fitness for human consumption. They provide however a close parallel with abattoir meat.

Whalemeat from a big Blue male is coarse, large-fibred and dark.

Meat from well-nourished whales is frequently very oily and may present an appearance of "marbling." That from young whales is firm and of compact texture.

While no estimate can be formed of the age of whales, it may be accepted that the larger the whale the greater its age; and in general it is found that the larger the whale is, the coarser will be the meat. In many such cases the meat is also excessively oily, and its value for freezing is doubtful, due to subsequent rancidity. The meat inspection picture would lead one to believe that whales are not long-lived creatures, and that a whale 20 years old has entered old age.

Of all Grade "A" meat, 65 per cent. came from males, 27 per cent. from non-pregnant females, and 8 per cent. from pregnant females.

While the numbers of males and non-pregnant females from which Grades "A" and "M" were obtained are closely related, only 29 per cent. of pregnant whales accepted for meat production were graded "A."

(4) *Colour of Meat.*—In the author's experience the colour of whalemeat is of great importance in visual inspection. Very considerable variations of colour are observed, from the glistening dark red of the short-period *post mortem* Blue whale, to the pale, light red, dull colour associated with the onset of wetness.

The change from a state of dryness to one of wetness occurs concomitantly with the relaxation of rigor mortis and is associated with an appreciable lightening in colour. Not infrequently a notable difference has been observed in the colour of whalemeat in a matter of minutes. This colour change is indicative of retrogression of the meat. It is the first stage in the degenerative processes which now accelerate rapidly, for following on the colour change from dark to light, accompanied always by increasing wetness, the meat not only assumes a muddy appearance but begins to lose its texture and to acquire a doughy consistency.

The onset of rigor mortis is usually very rapid and has

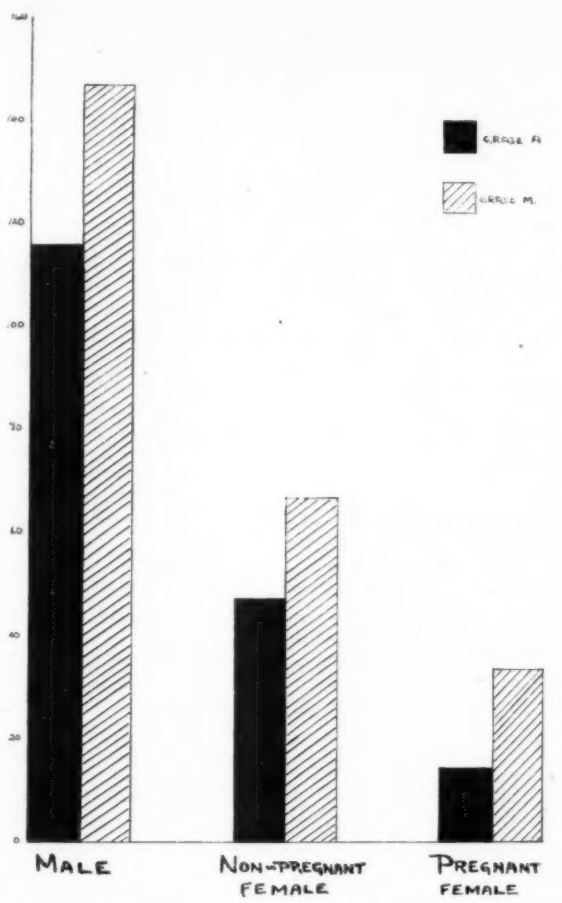

Fig. 2.—Relation of sex and pregnancy to grading of whalemeat passed as fit for human consumption. A = accepted as first grade, M = accepted for manufacture.

frequently been observed on the deck, but there is no difference in colour between pre-rigor meat and the same meat in a state of rigor.

In one fillet "two-colour" meat has often been noted: that on the inner or vertebral side of the back fillet being light in colour and wet, while the meat distal from the vertebrae is still dry and dark.

As rigor mortis relaxes, meat on the carcase is wet and light in colour towards the anterior end, while that nearer the tail is still dark and dry.

The majority of whales passed as fit for human consumption have shown dark-coloured meat at the time of inspection:—

	Light	*Dark*
Blue	12 per cent.	61 per cent.
Fin	8 per cent.	62 per cent.

(This ignores indeterminate shades in the process of transition, which were usually classified as Grade "M.")

In addition to the normal colour changes described above, the effect of blast from the grenade sometimes produces small islands of light-coloured meat, considered by the writer to be due to forcible back-bleeding and subsequent oxidation. Such meat, together with that damaged by the explosion and tainted by the powder, should always be rejected.

(5) *Muscle Reflex, Rigor Mortis and Wetness.*—The muscle reflex, or contractility, is a useful guide to the state of freshness of the meat, and it is present in a surprisingly high percentage of cases, but unfortunately seldom persists until the process of quick-freezing is commenced.

Muscular contractions will be evidenced on direct stimulation of dry pre-rigor meat. Dry meat which does not exhibit the reflex is in rigor. Wet meat never exhibits contractions of the fibres.

Relaxation of rigor occurs with the transition to a state of wetness, and the writer has first noted its onset in the deeper layers of the back fillets. In such cases the musculature of the outer layers of the fillets is found to be damp to the touch. This moistness is quite a distinct stage in the transition. It is of brief duration and moist meat not infrequently exhibits a faint and rapidly diminishing reflex on stimulation with a knife blade.

Wetness exists in ill-defined degrees, varying from the normal wetness which increases in degree concomitantly with the colour change, to the extremely wet, light-coloured and rapidly degenerating meat which, on the available evidence, is presumed to result from one or more of the hunt, struggle and towage factors. In such cases it would appear that a true state of rigor mortis has not occurred, or at least is not evidenced in the Longissimus dorsi muscle group, and this may well be due to a state of excessive fatigue existing at the time of death; thus conforming to the accepted belief that the muscle reserve of glycogen is diminished to such a degree that there is little or no formation of sarcolactic acid, the meat is of low acidity, the process of "setting" is overtaken by the degenerative changes and rigor mortis is eliminated.

Whalemeat in rigor is firm, dry and springy, resembling well-set bovine beef. Once rigor passes the firmness is lost. If a piece of post-rigor meat is squeezed a sensation of crepitation, never present during rigor, will be noted.

Muscular reflex may be absent near the head but present posteriorly from the lumbar area, while the presence of wet meat towards the head and dry meat towards the centre of the back and the tail is often observed. It might be expected that rigor mortis would commence at the head and spread towards the tail, and would pass off in the same direction, and it appears that this does, in fact, occur; but the process is complicated since relaxation of rigor not only occurs in a posterior direction, but also laterally.

The presence of rigor has been noted on the plan at three hours *post mortem*, while the muscle reflex has been observed, exceptionally, at 13½ hours *post mortem*. Almost invariably, however, contractility disappears completely within ten hours after death.

(6) *Bleeding.*—The mass of meat comprising a single fillet, which may weigh 3 tons or more, will not necessarily present a uniform appearance throughout. It is not always possible on visual examination to say whether or not there has been considerable loss of blood prior to the arrival of the carcase on the after plan. The picture is also complicated by the onset of wetness.

It would appear, however, that the well-bled carcase is one from which there has been substantial loss of blood from the harpoon wounds either externally or into the body cavities, and in which also the jugular vein has been severed prior to, or very soon after, death.

There is no reason to regard the whale as a peculiar mammal in this respect, and it is believed that the state of the musculature must undoubtedly be influenced by the amount of blood present, and that the meat will be

improved both in appearance and durability when as much blood as possible has left the carcase prior to its arrival on the after plan.

The technique of bleeding, as already described, is both simple and safe and there is no reason why, as has been suggested, it should not be adopted as a routine measure. It may well be that extraction of the greatest possible quantity of blood delays the onset of wetness and degeneration, by extending the pre-rigor period.

(7) *Skin Coloration of Whales.*—The skin of both Blue and Fin whales shows a wide variation in colour. There is no doubt that the whale, in common with most marine creatures, utilises in high degree the faculty of protective coloration. This is most noticeable in the camouflage effect presented by the dark back and light ventral surfaces, but refinements of colour are encountered in different sea areas and gradations of shade from light to dark, with varying degrees of mottling, are noted.

The "brown," or "golden" Fin is commonly encountered, particularly as the season advances. This coloration may extend right over the back and belly regions. It is frequently seen in patches on Blue whales, and in both species it may assume a greenish tint. It is due to a diatomaceous deposit, and it can readily be removed from the skin surface to which it adheres in a thin, uniform film. It is popularly believed that whales exhibiting this coloration are fat and in good condition, the line of reasoning being that the colour is due to the accumulation of matter on which the krill feeds. Therefore, if a whale has acquired this coloration it has been feeding in waters in which there existed a plentiful supply of krill-food, therefore there was a plentiful supply of krill, therefore the whale has been feeding well and accordingly it will be fat and the blubber layer will be thick. *Quod erat demonstrandum!* Deck observation did not support this facile theory, and the colour of the skin from whatever cause does not appear to have any association either with the degree of fatness or with the colour and condition of the musculature.

Scar tissue has been observed frequently, particularly on the dorsal surface and in the tail region, and may be the result either of ice damage or of old harpoon wounds. It is light grey or white in colour. The multiple small areas of scar tissue so common on the skin of Blue whales are due to damage inflicted by external parasites of the barnacle type while the whale is in tropical or sub-tropical waters.

It is possible that the skin of the whale is photo-sensitive since exposure to light for a period, as when a whale is afloat at the stern of the factory, induces a lighter coloration of the pigmented areas.

(8) *Temperature.*—The temperature of all meat was taken as a routine. Metal containers were made on board to house the thermometers which remained *in situ* in the musculature for a minimum period of two minutes. The temperature was taken in one of the back fillets at a uniform depth of 9 inches.

The range of temperature in meat whales appears to lie between the extreme limits of 88° F. and 94° F. and the optimum temperature, irrespective of species, sex or grade, is 90° F.

All the available evidence points to a very gradual and uniform loss of body heat from the Grade "A" carcase, the conclusion being that where hunt, struggle and towage have been brief the temperature does not tend to rise markedly *post mortem*.

In fillets removed from the body the rate of loss of heat is very slow. In one case, where two fillets had been despatched on the ferry boat and she was unable to land them on the refrigerating ship owing to heavy seas, the meat was brought back to *Venturer* and shipped 22 hours later. It was then extremely wet and the temperature was 55° F. to 57° F. at the extremities of the fillets, and 75° F. to 80° F. in the centre. An experiment in towing meat brought about a drop in temperature of only 1° F. as the result of complete immersion of a fillet in the Antarctic Sea for a period of two hours.

There are grounds for supposing, however, that the decline in carcase temperature is temporarily arrested by rough and prolonged towage and the various other factors which may affect the quality of the meat. Thus the temperature of wet meat within the ten-hour *post-mortem* period is slightly higher than that of dry meat of approximately the same period *post mortem*.

The conclusion reached is that taking the temperature of the meat in the manner described is a useful routine measure in whalemeat inspection: an additional factor in building up towards a decision not only regarding fitness or otherwise, but also in assessing the grading of the meat according to quality.

(9) *Smell.*—The smell of whalemeat is of little value in the routine of inspection. With the onset of putrefaction a faint sour odour can be detected, but this is seldom noticeable before 14 hours *post mortem* and other indications of greater significance will be manifest before then. The smell of all meat, until degenerative changes are well advanced, is faint and not unpleasant, irrespective of species, sex, wetness, dryness or oiliness.

It should be noted, however, that grenade-damaged meat will be tainted by powder blast, frequently reaching beyond the visibly affected areas with their black discoloration. The acrid odour is easily detected and the portion to be rejected should err on the side of generosity.

(10) *Putrefaction.*—The shortest time *post mortem* at which actual putrefaction, accompanied by visible degenerative changes, has been noted is 14½ hours. Green discoloration is first observed in the region of the anterior lobes of the kidneys. Of the muscle groups the Psoas is usually the earlier affected, and the first recognisable manifestation is the darkening of the white fibres of the intramuscular connective tissue.

Putrefaction is accelerated in those areas damaged by explosion of the grenade. It is accompanied by the typical acrid odour and traces of the black powder will be found at a considerable distance from the actual site of entry of the harpoon. Such damaged meat degenerates with extreme rapidity.

(11) *Disease.*—Disease is of minor importance in the inspection of whalemeat for human consumption. No evidence of specific disease and few pathological conditions have been discovered. Only one case of total rejection occurred. The findings are by no means comparable to those in the domestic animals.

There are various explanations for this freedom from disease, the principal one being the nature of the whale's environment. In Antarctic waters conditions are opposed to infection by most of the normal routes. Infection by inhalation would appear to be impossible. Infection by ingestion is unlikely since the Baleen whale is a selective and "clean" feeder. The ingested material invariably consists of large quantities of the small shrimp-like krill and in only a very few cases did the stomach contents vary and then only to include a number of the small, transparent "pipe-fish," which had been swallowed along with the mass of krill.

Infection by injection is largely obviated by the protective nature of the skin and blubber. Old harpoon wounds, where there is evidence of pus formation, are common. The

same type of lesion is seen in a lesser degree in the case of the "Discovery darts"—small metal tubes used to mark whales in obtaining evidence on their movements. Such lesions remain localised and there is a remarkable and massive formation of tough fibrous tissue in the region of any external wounds. Very occasionally the infection penetrates the deeper layers of the blubber and sometimes the musculature is affected by a form of rodent ulcer. Necrosis and gangrene of the tissues do occur in such lesions but are very seldom encountered.

Infection by coitus appears extremely unlikely. Typical of the folklore investing all aspects of whaling is the persistent legend that whales suffer from a form of venereal disease. No evidence of such a condition has been found, and indeed no lesions whatever have been observed in the genitalia or reproductive organs.

It is possible that other causes may contribute to this freedom from disease of whales examined on the factory. The weak, small or emaciated whale would be ignored by the gunners in favour of more suitable prey, and would tend readily to fall victim to the attack of the voracious Killer whales. The sole method of defence of the Baleen whale is his speed and any condition which would reduce this, or interfere with balance or buoyancy or locomotion, would render him liable to attack.

Whales are peculiarly liable to infestation by internal parasites. Every Sperm whale examined showed massive infestation of the stomach with nematodes.

Tapeworms commonly occur in the small intestine of the Baleen whales. The species vary in size from the slender worm a few inches long, which may be present in considerable numbers, to the tapeworm of upwards of 50 feet in length, the segments of which may be 2 inches broad. Several of the latter may be found in one whale.

In certain waters infestation is so common that search reveals the presence of tapeworms in every single case. It is remarkable that no emaciated whale was ever seen, and even such massive infestation produces no systemic effect.

From the intestines of Blue whales the following cestodes were recovered:—

Diplogonoporus balaenopterae (Lonnberg), 1892.
Priapocephalus grandis (Nybelin), 1922.
Tetrabothrius affinis (Lonnberg), 1891.

From the stomach of the Sperm whale the nematode *Anisakis physeteris* (Baylis), 1923, was isolated in large numbers, while *Crassicauda crassicauda* (Creplin), 1829, was obtained from lesions in the kidney perimeter of a Fin whale. One of the latter was exceptionally large for Crassicauda and may be a new species.

Of the pathological lesions by far the commonest takes the form of a round or ovoid encapsulated body which is found in the substance of the musculature. These bodies vary in size and weigh anything from a few ounces up to an estimated 150 lb. They are most commonly of golf-ball size and are usually found in the substance of healthy Psoas muscle, or lying just under the blubber. They may be single or multiple. As many as 30 have been found within one small muscle area. They contain an impacted yellowish material which exhibits calcification and caseation.

Calcification and caseation occur very frequently. Encapsulated root-like bodies are often found in the kidney, pancreas and lung. These are irregular in shape and contain a gritty, inspissated, pus-like material. The regional lymph glands may be involved and may present a picture somewhat resembling that of caseous lymphadenitis.

Small nodules containing similar evidence of caseation and calcification have been found in the serous surface of the small intestine over most of its length. Microscopically these nodules were made up of secondary nodules of concentrically arranged collagenous fibrous tissue, all embedded in a fibrous tissue mass. These lesions are possibly the end stage of multiple small abscesses of parasitic origin.

In the early part of the season a small amount of very crude laboratory work was attempted. Growths from the commonest type of lesion on a number of media, including a penguin's egg variant of Dorset's medium, were invariably staphylococcal. No acid-fast organisms were ever noted.

It appears possible that such lesions are degenerated intermediary stages in the life cycle of internal parasites.

The lesions are of small importance from a meat inspection point of view. When they are found in the musculature it is recommended that the tissue immediately surrounding them should be generously excised and discarded. The condition is never sufficiently generalised to warrant rejection of the entire carcase.

Benign tumours have been observed. They are lipomatous in character and may or may not be encapsulated. They are invariably pedunculate, and are believed to be of no importance.

The normal deposition of visceral fat frequently assumes peculiar forms and shapes and it is common to find, on the serous surface of the stomach, around and on the spleen, and in the omentum, pedunculated balls of encapsulated fatty tissue.

Enlargement of the liver is seen occasionally. The conditions are unidentifiable clinically but are not accompanied by any evidence of jaundice or of parasitic infestation. Histologically, (1) large fat spaces were noted compressing the adjacent hepatic cells. Small fat vacuoles were seen in a few hepatic cells in the section. Haemosiderosis was also a feature and a mild hyperaemia was present in this section: (2) severe cirrhosis, the fibrous tissues being particularly dense with fibres arranged concentrically around spaces in the liver substance: (3) a specimen of liver which exhibited petechial haemorrhages showed in section acute, diffuse, degenerative changes in the hepatic cells. The capsule was very thick and focally suffused with erythrocytes.

Calcifying lesions from pancreas and kidney showed, microscopically, a chronic tissue reaction surrounding circumscribed groups of what appeared to be coccidial oocysts.

The single case of total rejection on the ground of disease was a Fin whale carcase which exhibited, over the back region, the greenish-yellow coloration already mentioned. It was thin, but not emaciated. During removal of the fillet a large abscess was revealed between the second and fifth lumbar vertebrae. This was situated ventrally in the substance of the bodies of the vertebrae and contained a large quantity of fluid yellow pus. The bone was diseased and brittle for a length of several feet, there was no encapsulation and the muscle tissue in the vicinity was soft, light in colour and friable. No external injury could be discovered and the dorsal vertebral area was unaffected. On examination on the forward plan an extensive chronic peritonitis was found. The grey, felt-like fibrous material completely covered the peritoneum, the stomach and the visceral surface of the liver. There were extensive adhesions between liver and stomach, and between spleen and stomach, but the intestines were unaffected and the thoracic viscera were healthy. The cause of the condition remains obscure.

No evidence of disease was ever noted in any pleural membrane, but examination of this is difficult since only one "side" can be inspected and that is invariably grossly blood-stained and may be damaged. Of the peritoneum no

more than a few square feet are visible at any one time owing to the nature of the lemming operation.

It is understood that very occasionally whales have been observed whose blubber and membranes were pink in colour. No such carcase has been seen by this expedition, but if the condition exists it would suggest a form of jaundice.

Discussion

(A) The paper describes in outline the various phases of Antarctic Pelagic Whaling, and in particular the production of whalemeat as a by-product from the basic industry of whale oil preparation.

The main causes of rejection of whalemeat as unfit for human consumption are putrefaction and harpoon damage.

Whalemeat degenerates with remarkable rapidity and the primary essential in attaining the maximum yield is speed in every phase of operations.

The whale must be killed quickly and delivered to the factory with the minimum of delay. Meat whales must receive priority of treatment to permit of the commencement of processing with no time-waste after delivery.

Following removal of meat from the carcase the fillets must be cut up quickly and efficiently, and the process of freezing should be commenced as soon thereafter as possible. It will be obvious that the factory which is equipped with freezing apparatus (as on *Balaena*) has a considerable advantage over that which—as in the case of *Southern Venturer*—has to tranship all meat to a freezing vessel. In the latter case, speed and efficiency of transhipment and handling are of major importance.

The subject of hygiene is, as always, important and the difficulties are fully discussed. Having due regard to the nature of the operations on the flensing and lemming decks of floating factories it must be accepted that abattoir standards of hygiene are impossible of attainment. Nevertheless, the production of whalemeat conforming to the highest sanitary standards is possible, provided that every effort is made to avoid deck contamination of the fillet during its removal from the carcase, and also to avoid further surface contamination during handling.

While a certain lowering of desirable standards of hygiene on the factory decks must be accepted as inevitable it is emphasised that at all stages following removal of meat from the carcase, minute attention must be paid to hygienic measures if the resultant product is to be acceptable as wholesome on aesthetic and historical grounds alone.

The surface trimming of all fillets of meat has been adopted as a routine measure on the advice of the author. Not infrequently, and particularly during removal of the Psoas musculature, heavy faecal contamination occurs owing to rupture of the intestines. In such cases surface trimming has been proved to be ineffective and the meat is rejected.

(B) That part of the paper which is the result of original observation and practical experience is concerned with the inspection of the whale carcase.

(1) The availability of accurate information on the time of death of the whale is considered to present a most valuable guide in the routine of meat inspection. The great majority of whales from which meat fit for human consumption can be obtained have been found to be under ten hours *post mortem* at the time of examination.

The routine of inspection did not preclude, or ignore, the ten-hours-plus *post mortem* carcase, but the number of such whales passed as fit for human consumption was negligible. The average time *post mortem* of all acceptable meat was 6 hours 21 minutes.

(2) Species, sex, age, length and skin colour of whales are discussed. The bearing of these factors on the suitability or otherwise of the meat for human consumption is considered to be of minor importance.

(3) The colour of whalemeat is considered, and the importance of the colour-change in relation to the relaxation of rigor and the onset of wetness is stressed. Fresh whalemeat, *i.e.*, that in rigor or prior to the onset of rigor, is always dark red and dry. As rigor relaxes, the degenerative changes commence, the meat becomes wet and there is a progressive lightening of colour.

(4) It is submitted that the appearance and durability of the meat are favourably influenced by the extraction of the maximum amount of blood after death. A technique for severance of the jugular vein is described and the method of use of an instrument designed by the author for this purpose is explained.

(5) The temperaturing of all meat is recommended as a routine. The optimum temperature is 90° F. Meat from any carcase, the temperature of which is below 88° F., will be found to be unfit for human consumption.

(6) The significance of muscle reflex and rigor mortis are discussed. The unpredictable nature of the onset of rigor is noted and an explanation is forthcoming in a combination of the hunt, struggle and towage factors. Meat in rigor and meat before the onset of rigor are suitable for human consumption. After relaxation of rigor the degeneration begins and is evidenced by wetness of the muscle substance. This progresses rapidly to the stage of putrefaction. Wet meat is not necessarily unacceptable, but the author considers that all wet meat from a carcase over ten hours *post mortem* should be regarded with extreme suspicion. Meat which exhibits contractility of the muscle fibres, and meat which is in rigor, are always dry and are the source of quality whale steak production.

(7) The sour odour indicative of putrefaction, and the acrid odour of meat tainted by powder blast, although of minor importance compared to other manifestations, cannot be ignored. Olfactory examination should be included in the routine of inspection.

(8) Visual evidence of putrefaction has never been observed to occur earlier than 14½ hours *post mortem*. The primary change in muscle tissue is loss of texture, with darkening of the tiny fibres of intramuscular connective tissue. This is usually evidenced in the first place by the Psoas group. Meat damaged by the explosion of the grenade degenerates more rapidly than normal uninjured musculature, and the excision of damaged tissue should be bold.

(9) No evidence of specific disease has been forthcoming from the examination of approximately 2,000 whale carcases during the 1948 to 1949 season. The pathological conditions discovered appear to be due almost entirely to parasitic infestation, or to trauma followed by subsequent infection, generally by staphylococci. In the latter case the super-abundant formation of dense cicatricial tissue is noted. The freedom from disease is discussed and the nature of the observed lesions is described. This description has been aided and amplified by subsequent laboratory examination of specimens collected and preserved during the season. When intramuscular lesions are discovered, the lesions and the tissues surrounding them should be excised and rejected. The remainder of the meat may be passed as fit for human consumption.

Acknowledgments.—I am indebted to Mr. L. M. Markson, M.R.C.V.S., of the Veterinary Laboratory, Ministry of Agriculture and Fisheries, who carried out the histological examination of numerous pathological specimens. My thanks are also due to Dr. H. A. Baylis, of

CLINICAL COMMUNICATIONS

VIBRIO FOETUS INFECTION IN A DAIRY HERD*

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OTLEY, YORKS

This is the clinical history of a herd of pedigree Ayrshire cows which for the last two years has passed through a period when breeding troubles have interfered very considerably with the economy of the farm. Abortions themselves have not been a significant feature and the main characteristics have been post-calving and post-service discharges with many cows and heifers failing to conceive. In order to assess the position adequately it is necessary to trace changes in the herd over the last three years. In 1947 this dairy herd consisted of approximately 200 animals, of which 60 were milking, and it was almost a self-contained unit. The only new animals introduced were a few newly dropped calves and at this time there were no infertility problems in either cows or heifers. In June, 1949, a policy of improvement was put into operation and 100 non-pedigree animals were sold and their places taken by odd cows and heifers, mainly bought in Scotland, and selected according to their blood lines. The only bull on the farm was a pedigree bull—Bull A—who came in 1946 and who is now supplemented by two of his own sons, Bull B and Bull C, both of which were born on the farm. This system of improvement was followed until October, 1949, when the herd was brought up to full strength and no more beasts have since been introduced.

In September, 1948, two cows were brought which we now know from the events which followed to have been possible sources of infection. The first one was a cow which was ruined as a milking animal by a previous attack of mastitis and which was bought purely for breeding purposes. She was barren when she came and was served by Bull A a fortnight after arrival, but did not conceive. The second animal was a cow-heifer which was bought in calf and she calved normally on the farm. She was served by Bull A, whose immediately previous service had been to the first cow mentioned above. While this first arrival did not show a post-service discharge, the second one exhibited a copious discharge from the vagina a few hours after service. This was the first occurrence of many similar post-service discharges. The first cow not becoming pregnant and having two teats only was fattened and sold. The second cow was allowed a summer's run at grass and was served again by Bull A in October, 1949. The service was promptly followed by more discharge and while this was soon over, two services by artificial insemination in the next six months failed to get her in calf. She received penicillin treatment in June, 1950, and is now probably in calf to Bull C.

During November and December, 1948, the first trouble with discharges after normal calvings appeared. One was a cow and the other a heifer, both had been home bred, and both discharged before they came into service. In spite of various treatments it proved impossible to get them in calf and eventually one was slaughtered on account of kidney disease and the other one was fed for beef.

From three of six samples of discharge collected about the same time in December, 1948, *Corynebacterium pyogenes* was isolated. Other discharges examined during the next 12 months were mainly free from *C. pyogenes*, but these were generally taken after treatment, consisting of uterine injections of various medicaments, and it was thought that some good was being achieved. After some delay, characterised by post-service discharge, all the animals were got in calf during early 1949, but it was noticed that all the heifers running with Bull B did not show discharges. This is possibly connected with the fact that this bull had been used only on clean heifers. Six heifers were sold newly calved in August, 1949, and they behaved normally.

Two more cows were purchased in July, 1949, and these again must be considered as possible carriers of infection. Both were bought, reputedly in calf, but they each came into service soon after arrival. The first one was served, conceived and calved normally, but the second was served repeatedly until December, 1949, after which she was not served again until April, 1950, when she was served by Bull A and again immediately showed a discharge and was slaughtered. The reproductive tract was examined in the Leeds laboratory without any specific infection being detected.

Soon after these last two cows were bought it was found that numerous cows in the milking herd were producing copious discharges after service and the position continued to deteriorate. In November six typical discharges were submitted to the Weybridge laboratory, but no progress was made in identifying the infection. It was at this point, in November, 1949, that a batch of approximately 30 virgin heifers was divided into three groups, each of which was then served by a different bull. Two of the groups were served away from the farm by pedigree bulls belonging to other herds and they all held to their first service and eventually calved perfectly normally. The third group of 12 heifers was kept on the farm and allowed to run with Bull A. Every member of this group returned to service with one exception. This last animal became pregnant and she finally aborted at seven months of gestation and *Vibrio foetus* was obtained in pure culture from the fourth stomach of the foetus.

One of the older cows on the farm had been affected with pyelonephritis since the latter part of 1948 and, although in poor condition, it was decided to keep her on the farm for the sake of the pedigree calf she was carrying. She calved in November, 1949, without any discharge and in January, 1950, penicillin treatment was given for the kidney disease. A five-day treatment was given, consisting of 1 by ½ by ½ by ½ by ½ million units of penicillin. She was served by Bull B and held. This was in very striking contrast to the rest of the herd, which after service were all showing copious discharge and a return to service in three weeks' time. In fact by this time Bull A had already been given " sexual rest " by the owner since December, 1949, and he was not used again until he was tried on the cow which was slaughtered for experimental purposes in April,

* Made to the Yorkshire Division, N.V.M.A., November 3rd, 1950.

the British Museum, for examining and identifying the various internal parasites mentioned. For the statistical work of preparing the diagrams* from a mass of data I am grateful to Mrs. E. Ross Cockrill, M.R.C.V.S. Acknowledgment must also be paid to my assistants, Mr. W. A. Austwick and Mr. N. Norris, meat inspectors, whose capability and enthusiasm contributed in no small measure to the successful outcome of the season's work.

* Two now reproduced.—*Editor.*

1950, and at the same time on another cow which also promptly discharged and which came back into service in three weeks' time.

The infertility on the farm reached a climax in February, 1950, when out of 43 milking animals only nine were in calf and the rest were in the stage of repeated services, each of which was followed in a few hours by copious discharge. At this time a further six discharges were sent to the Weybridge laboratory together with blood samples from the same animals and these were examined for agglutinins against *Vibrio foetus*. All gave a positive reaction, except one cow, which is still barren after various treatments and which is considered to be a separate case from the trouble in the rest of the herd. The discharges were examined bacteriologically without detecting specific infection. The blood samples were also examined for *Brucella* agglutinins, but were all negative. This was expected, for it has been the practice on this farm to vaccinate with *Brucella abortus* S. 19 vaccine all calves at six months of age, in addition to the cows bought in.

A heifer aborted at seven months of pregnancy in April, 1950, but the foetus was not examined by the laboratory.

The situation on the farm was so bad that any treatment offering any chance of success was attempted. The case of the cow with pyelonephritis, which was the only animal to pass normally from calving to subsequent pregnancy, was so outstanding that at the beginning of April a number of cows were given a five-day course of treatment with penicillin, consisting of 1 by ½ by ½ by ½ by ½ million units, in the hope that the procedure would be of value. Either six or eight cows were treated, each was served by Bull B, and each conceived at the first service, showing no discharge and there was no subsequent return to service.

This result was so dramatic that in June the experiment was repeated by the V.I.O., who gave to Bull A a five-day course of treatment with penicillin consisting of 6 by 3 by 3 by 3 by 3 mega units and who also treated seven cows with 4 by 2 by 2 by 2 by 2 mega units over five days. These cows also were served without a subsequent discharge and all are in calf to the first service after treatment with the exception of one. This cow returned to service, but did not discharge. She conceived to the next service.

The history of Bull A following treatment with penicillin is worth recording. It will be recalled that he was rested from service in December, 1949, when the post-service discharges were becoming prevalent, and he was not used until the middle of March, 1950, when he served two cows, both of which promptly gave a copious discharge. A week after his penicillin treatment he was used on several animals, none of which discharged, and he has been used frequently since without trouble. In order that Bull B might have all the protection possible he also was given penicillin as soon as it was seen that Bull A had benefited from such injections.

Two cows holding to January services aborted in October, 1950, and from one foetus *Vibrio foetus* was cultured. All the cultures from the stomach of the other foetus were overgrown so that *Vibrio foetus* was not identified.

The state of affairs now is that of 18 cows given penicillin treatment all except one have held to the first service and this animal held to the second.

Until the early part of 1949 there had been a certain number of breeding contacts with other herds in the vicinity. In one case a heifer served by Bull A came into season and was served by another farmer's bull. She conceived to this service and no trouble has been observed by this farmer. In another case five cows belonging to a neighbour were served by Bull A; one conceived, the others broke and discharged. They were given the uterine irrigations adopted at that time and when clear of discharge they were artificially inseminated and conceived straight away. The farmer's own opinion is that his Bull A probably became infected about this time, but it is possible that most of these outside contacts were not infected from this source since at this time the bull was probably not infected. At any rate, they have not led to the development of trouble on other farms.

This account of the herd would not be complete without reference to the unsuccessful forms of treatment which at first were used. In the early stages, when it was thought that a virulent strain of *C. pyogenes* might be the cause of the trouble, intra-uterine injections were given repeatedly. Lugol's iodine was followed by the administration of pento flav cones and then propamidine was given three times at two-day intervals. This last method resulted in almost the clearance of the discharge in some cows. Apparent cures were, however, achieved with cetavlon, but it was soon found that an apparently clean cow would again produce discharge after service. Only one animal was condemned on account of anatomical abnormalities, and in order to be sure, the Sterility Officer examined a number of cows and passed them as to all appearance perfectly healthy individuals. Service to these animals was immediately followed by copious discharges. The discharge, presumably uterine in origin because the vagina and cervix invariably are normal in appearance, takes the form of grey slimy mass, which is seen lying in a pool covering the area of a dinner plate behind the newly served animal. The general course is for the discharge to pass through a stage in which it consists of long strings of fairly clear mucus containing at first numerous white flocculi which become less and less as time goes on until the discharge clears up. It would appear almost that the intra-uterine treatments will clear up secondary infections effectively but fail to touch the primary one.

It is certainly the case that this is a most insidious disease which is liable to become well established on a farm before diagnosis is possible.

DISCUSSION

Mr. A. S. Harris (Barnard Castle) said that he had come especially to learn what he could about *Vibrio foetus* infection. In his district Ayrshires were not as common as shorthorns, but he wanted to be prepared. He asked particularly about the time of the discharge after service and in what period of gestation abortion was most likely to occur. Also he was interested in the treatment to be advised in a herd where the disease was identified.

Mr. Lofthouse replied that in nearly all his cases the discharge appeared in four to five hours after service and continued for some days. He suggested that if it was noted in cows which previously had been "clean," then it was a pointer towards vibriosis. The period of gestation when abortion occurred was not as defined as in trichomoniasis or brucellosis. It might be claimed that animals which broke at six or nine weeks after service passed an abortion in their discharges in the form of the white "blob," which had been noted in some cases. More obvious abortions were recognised at three, four to five months, and it was in such material that the laboratory had the best chance of isolating the causal organism. He emphasised that the laboratory must be provided with a foetus which was fresh and intact in order to have a reasonable chance of bacteriological success. While he had used many kinds of treatment on "dirty" cows, he was strongly in favour of a course of penicillin as an immediate treatment. It was stated in the *Lancet* recently that *Vibrio foetus* was susceptible to penicillin, and he believed that it had cured the basic infection. Other treatments probably influenced the secondary organisms only. It was now being decided whether all the animals in this herd were to receive penicillin treatment at once in an attempt to eliminate the infection from the farm. Whether penicillin applied by intra-uterine injection would be a reliable treatment was unknown, but it could conceivably be useful when the discharge was abundant.

Mr. Beattie (Wakefield) asked for the differential diagnosis between vibriosis and trichomoniasis.

Mr. Lofthouse said that the only certain means was by laboratory methods, the history of a herd itself being of doubtful value unless evidence of contact with a source of infection could be found.

Mr. T. Johnston (Northallerton) enquired about the nature of the discharge which developed so quickly in an affected animal from an apparently normal genital tract. Was it of an anaphylactic nature?

Mr. Lofthouse thought it was probably a flare up of the secondary infection. With Mr. Thomson, the then Sterility Officer, he had definitely confirmed by vaginal examination that both vagina and cervix were normal before service, yet discharge had poured out a few hours after service.

Mr. Beattie asked if the infection was mechanically transmitted by the bull or whether the semen was infected.

Mr. P. L. Shanks (Leeds) replied to this question. He explained that Dutch workers had inclined to the view that the bull was merely a mechanical carrier of the vibrio between females. However, from the experience of the V.I.O. laboratory this did not appear to be the case. In both Mr. Lofthouse's herd and in a second farm it had been noted that the bull was infecting 100 per cent. of the animals he served. This was hardly to be expected if transmission was purely mechanical. The precise method of transmission was of great importance, especially with regard to artificial insemination centres. The presence of vaginal discharge was not an essential feature of the disease as was shown in this second farm where discharges were by no means common. The course of the infection in a typical herd was somewhat as follows. First, there was an acute phase when many animals, especially heifers, returned to service at irregular intervals and showed varying amounts of discharge. Few abortions were noted, probably at the most 5 per cent., and the disease was in no way like brucellosis where the "abortion storm" could be severe. Even when no treatment was carried out, in time the infection passed to the chronic phase when some resistance had been developed, but the animals were not immune. Cows would probably require two or three services before holding, while heifers settled only after five or six services.

After penicillin treatment Mr. Lofthouse's herd had shown such excellent improvement that he had already advised the mass treatment of the second herd and arrangements were now being completed for all the animals, except the young, sexually immature stock, to receive a four-day course of treatment of 5 by 5 by 5 by 5 mega units of penicillin.

A serious method of spreading the disease over wide distances was the practice of lending and borrowing bulls, which was very common amongst pedigree breeders. He would recommend that a farmer borrowing a bull should have the bull injected with probably 4 mega units, followed by 2 by 2 by 2 over the four days immediately after arrival. The results obtained by the present trials would be available in one year's time and would be awaited with great interest.

Mr. W. B. V. Sinclair (Leeds) said that he had found the immediate discharge after service to be a useful aid to diagnosis. He had come across a clear-cut case of transmission by the bull in a farm which had been "clean" up to the introduction of a bull from a herd now known to be infected with vibrio. Nothing was noted at first, but nine weeks after service all the cows served by this bull came into oestrus and the farmer's description was that they passed a "blob" of discharge. There had been no opportunity of examining one of the "blobs," but it was thought that they had, in fact, been the foetal remains. He confirmed that a vaginal discharge was not always found in herds which were infected—its presence probably depended on the immunity of the animals which again was dependent on the time the infection had been present in the herd. He thought that in certain cases the infection had been passed to cows artificially inseminated and that this indicated that the organism was present in the semen. He had been amused to hear from Scotland, where so much of the disease had been found, that it was called the "English" disease.

Mr. G. D. Curry (Beverley): "Is is not possible to make this a notifiable disease?"

Mr. Sinclair pointed out that this was quite impossible until an accurate method of diagnosis was available.

Mr. T. Johnston (Northallerton) asked how soon a bull could be used in safety after having had a course of penicillin.

Mr. Shanks suggested and Mr. Lofthouse confirmed that the bull would be safe 24 hours after the last injection of penicillin.

Mr. H. B. Allan (Harrogate) enquired about the use of the blood agglutination test for diagnosis.

Mr. Shanks replied that, like the tricin test, it had a value when applied to the entire herd, but that its interpretation in the case of the individual animal was most unreliable.

Mr. D. Christie (Northallerton) asked if the testicles of infected bulls had been examined. He was thinking of a vaginitis in Rhodesia which had been found to be associated with epididymitis in the bull.

Mr. Shanks explained that examination of the genital tract of one infected bull had failed to show anatomical changes and cultural examination had not proved successful. The richest source of the organism appeared to be the fourth stomach of the aborted foetus and even from there, using special media, one was not always successful in isolation.

Mr. Procter (York) said that on an infected farm an animal with irregular oestral periods had now become regular after penicillin treatment.

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THE USE OF GOLD AS A THERAPEUTIC AGENT IN SMALL-ANIMAL PRACTICE

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Gold has been used for many years with a variable degree of success in the treatment of chronic inflammatory processes in the human subject, but is rarely employed in veterinary practice, possibly due to its supposed high cost. The writer has employed gold therapy with some measure of success in the treatment of low-grade inflammatory conditions affecting the joints and musculature of the dog.

The gold used was in the form of "Myocrisin" (May & Baker's sodium aurothiomalate). The aqueous solution of this drug was administered by intramuscular injection into the gluteal region in accordance with a dosage scheme recommended by the manufacturers.

Success has been recorded by McCarmick[1] using this preparation in the treatment of cases of arthritis in the dog, but further case records are scanty.

In the writer's limited experience of the use of Myocrisin, success has been obtained in the treatment of these forms of arthritis and allied conditions in the dog:—

(1) Temporo-mandibular arthritis.
(2) Chronic bilateral gonitis.
(3) Ossification (calcification) of the intervertebral discs.
(4) Lumbar fibrositis with accompanying paraplegia.

Brief case histories of these conditions are set out below.

(1) Temporo-mandibular Arthritis

Subject.—Nine-year-old mongrel terrier bitch.

History.—The animal had developed the habit of walking about throughout the day gripping a large object between its jaws. This habit had been in evidence for some years, and the owners had been wont to pander to it by giving the bitch half a loaf of bread to carry. Professional advice was sought when it was noticed that the animal had difficulty in eating and was unable to close its mouth.

Examination showed considerable wasting of the temporal and masseter muscles, inability to move the lower jaw more than about $\frac{1}{2}$ in., the mouth hanging slackly open, and some enlargement of the temporo-mandibular joints. These joints were rather tender to palpation and the animal resented forced movement of the mandible. There was some loss of general condition, probably due to the difficulties of prehension and mastication. The rectal temperature was normal and the animal was quite bright and alert.

Massage of the wasted musculature and the affected joints with a mildly stimulating liniment was ordered and was assiduously carried out for a fortnight. At the end of this time there was no appreciable improvement in the animal's condition and it was resolved to try the effect of Myocrisin. A test dose of 0·01 g. evoking no untoward effects, five further injections of 0·02 g. were administered at weekly intervals. During this period the animal showed a continuous and marked improvement. After the last injection

the bitch held her mouth closed normally and experienced no difficulty in prehension or mastication. The joints were still slightly swollen, but no longer painful and the mandible was freely movable. There has been some increase in the substance of the masseter muscle since that time, but the temporal muscles are still very atrophied with disuse.

(2) Chronic Bilateral Gonitis

Subject.—Four-year-old Cocker Spaniel dog.

History.—The animal had been stiff in the hind quarters for some months and professional advice was sought only when the animal experienced great difficulty in getting on to its feet.

Examination showed considerable wastage of the musculature of both hind legs and great enlargement of both stifle joints. The dog resented moderate passive extension and flexion of these joints. Great difficulty was exhibited in attaining the standing position; once on its feet the animal moved very stiffly and on occasion proceeded by a series of rabbit-like hops. The dog's general condition was rather poor, temperature normal and appetite fairly good.

Myocrisin therapy was instituted and a gradual improvement resulted, so much so that treatment was discontinued after eight weeks. At this time the animal was running about fairly normally, although the stifle joints were still very enlarged. The dog was putting on weight and its general condition was improved considerably.

Six months later the animal had a sudden relapse and became paraplegic. Destruction was tentatively advised, but further treatment was requested. Four more Myocrisin injections restored the animal to comparative normality and since that time a precautionary dose of 0·02 g. Myocrisin has been administered every fortnight.

(3) Ossification (Calcification) of the Intervertebral Discs

With the increasing use of radiography in canine practice, calcification of the intervertebral discs of the dog has been brought to the notice of clinicians as a possible source of previously obscure nervous symptoms. The aetiology of the condition is unknown, but the rather striking breed incidence in the long-bodied, short-legged breeds, *e.g.*, the Dachshund and the Pekinese, suggests an hereditary basis, possibly in the form of a susceptible conformation. In the writer's four cases the affected discs have been confined to the lumbar region, the portion which is most exposed to stresses and strains during life.

Radiographically, the calcification process appears to commence in the centre of the disc and slowly to proceed peripherally. No histological examination of affected discs has yet been carried out, but from our knowledge of the structure of the discs it would seem that the term calcification is a more correct description of the process than ossification. Cartilage is relatively avascular, the centre of the discs being especially so, and active ossification requires a fairly efficient blood supply. Calcification, on the other hand, is a passive process commonly encountered in senile cartilage throughout the body. Sufficient statistics have not been collected to assess whether the condition is, in fact, associated with old age, but the writer's four cases were all over five years of age. Three of the four cases were in Dachshunds, the fourth animal being a Corgi, and all were males. Kirk[2] records that he has encountered five cases of the condition, all of which were in Pekinese, but he does not record the sex of the animals. Amongst the symptoms produced he gives: bouts of acute pain at increasingly frequent intervals, stiffness and occasional ataxia. The same author quotes a case reported by Schnelle[3] in which inflammation of the discs with calcification caused intense pain in a Cocker Spaniel.

In the present writer's experience of this condition a suspicion of calcified intervertebral discs should be aroused by the following clinical syndrome and a radiographical examination of the spine made:—

The animal shows bouts of acute pain lasting a variable length of time, in which it may shriek out, draw its hind legs up to its trunk in apparent agony and possibly lose consciousness. Yelping when touched or when forced to move is another frequent symptom. These bouts are followed, initially, by long periods of normality, sometimes as long as six months elapsing between the attacks, but the intervals become increasingly shorter as the disease progresses. In the later stages the animal may show stiffness in the hind quarters and some degree of ataxia which may progress to complete paraplegia.

Brief case records of the four cases are given to illustrate the clinical syndrome referred to above.

Case 1. *Subject.*—Nine-year-old Dachshund dog.

History of bouts of intense pain, in which the hind legs were drawn up to the trunk, the animal fell over and appeared to lose consciousness. Occasionally the dog would suddenly cry out in apparent pain. Recovery occurred in a very short time and the animal was then apparently normal. These bouts had been going on for some months, initially at about fortnightly intervals, but recently had become more frequent.

Examination showed a fairly normal dog, except for a slight ataxia with some dragging of the hind legs. Optic discs and pupillary reflexes were normal and the pupils were symmetrical. The pedal reflex in the hind legs was definitely sluggish. Radiography revealed three calcified intervertebral discs in the lumbar spine.

Gold therapy produced a complete recovery from the symptoms, no attack having occurred for the last 12 months. A further radiograph nine months after the last attack showed that the degree of calcification of the discs was unaltered.

Case 2. Subject.—Five-year-old Dachshund dog.

Presented with complaints of stiffness, crying out when touched or even when moving of its own volition. This state of affairs had been in existence for three months before advice was sought. A slight degree of ataxia was present.

Radiography revealed two calcified discs in the lumbar spine. Gold therapy was completely successful after six injections.

Case 3. *Subject.*—Five-year-old Dachshund dog.

History of sudden onset of attacks of acute pain, the animal crying out if moved, although the appetite remained normal. A progressively worsening ataxia was becoming apparent over the last six weeks.

Radiography revealed two calcified lumbar intervertebral discs. Myocrisin therapy was instituted, but after only the test dose and one of 0·02 g. complete paraplegia occurred and the animal was destroyed at the owner's request.

Case 4. *Subject.*—Five-year-old Corgi dog.

History of a gradually increasing stiffness of the hind quarters over the last two months. Occasionally the animal would cry out as if in pain.

Examination showed normal reflexes, but the whole of the body was held stiffly and when the dog's head was pressed down between its forelegs, both the hind legs were raised off the ground, the body pivoting on the fulcrum provided by the forelegs. A suspicion of chronic ossifying pachymeningitis was aroused, but radiography revealed three calcified lumbar intervertebral discs.

Myocrisin therapy was very successful in producing an entire disappearance of the symptoms.

From these cases certain hypotheses may be advanced. The mode of action of the Myocrisin is difficult to understand, but it is also difficult to ascertain the way in which the calcification of the discs produces the observed symptoms. From examination of the radiographs one would hesitate to state that the calcification produces direct pressure on the spinal cord, as none of the calcified areas encroaches on the lumen of the spinal canal. Possibly the initial changes in the disc are inflammatory in nature and pressure of inflammatory exudate, not obvious radiographically, may cause the syndrome described. Gold therapy might assist to resolve the inflammatory changes and thus alleviate the symptoms. The actual calcification appears to be unaffected by the course of treatment as far as can be assessed radiographically.

(4) Lumbar Fibrositis with Accompanying Partial Paraplegia

Subject.—Four-year-old Corgi bitch.

History.—The animal suddenly went off its food, became very stiff in its hind quarters and screamed when lifted or even touched. After three days advice was sought as no improvement had occurred.

Examination showed a normal temperature, pulse and mucous membranes. The animal resented being handled and yelped when forced to move. Optic disc, pupillary reflex normal and pupils symmetrical. Pedal reflex sluggish on hind legs. Definite heat and exquisite tenderness of the lumbar muscles was apparent on palpation of the area. Radiography negative. A diagnosis of lumbar fibrositis was made and salicylates prescribed. A week later there were signs of a definite deterioration in the animal's condition. There was now a considerable degree of ataxia, the hind legs being dragged in a semi-flexed position. Later the same day the bitch became paraplegic.

Myocrisin therapy produced a spectacular recovery. After two injections the animal was walking with only a slight trace of stiffness and this disappeared after a further injection.

It may be argued that in this case recovery was spontaneous and the writer accepts this possibility, but would emphasise the definite way in which the Myocrisin injections marked the halt in the deterioration in the animal's condition.

Apart from the recorded cases the writer has used Myocrisin in several cases of "rheumatism" in dogs in conjunction with the salicylates with an encouraging degree of success.

Conclusions

From the cases recorded above it would seem that gold therapy can occupy an important place in the resources of the small-animal practitioner. Results in the treatment of low-grade inflammatory conditions in the dog are encouraging and justify an extended use of this form of therapy. It would appear that the agent relieves the symptoms but is unable to remove the effects of the inflammatory process, *e.g.*, the enlarged stifle and temporo-mandibular joints were still enlarged, and the degree of calcification of the intervertebral discs unchanged at the conclusion of the treatment. The name "gold" inevitably conjures up visions of high costs, but such treatment will be found to be well within economic bounds.

Summary

(1) The successful employment of gold therapy in cases of chronic arthritis of the temporo-mandibular and the stifle joints, of calcification of the intervertebral discs, and in a case of lumbar fibrositis in the dog is recorded.

(2) Some observations on the aetiology and the effects produced by calcification of the intervertebral discs of the dog are noted.

(3) The possible mode of action of the gold compound is discussed and a more extensive use of this form of therapy is suggested in view of the encouraging results obtained.

(Concluded at foot of next column)

References

1 McCarmick, A. J. (1943.) *Vet. Rec.* **55.** 179.

2 Kirk, H. (1945.) Index of Diagnosis for the canine and feline surgeon. Second edition. Pp. 288-289. London: Baillière, Tindall & Cox.

3 Schnelle, G. B. Quoted by Kirk.

ABSTRACTS

[Haemolytic Disease in Foals. Cronin, M. T. (1950.) *Irish. vet. J.* **4.** 138–141.]

At birth the foal is normal and may, if allowed, suckle strongly. Symptoms appear between 12 and 72 hours after birth and the course of the disease may be peracute, acute or subacute. The foal is lethargic, the respirations may be laboured and often there is frequent yawning. There is no pyrexia, but the pulse rate is increased. The mucous membranes are pale and later become icteric, the urine may contain haemoglobin, and the faeces are often bile stained. The main changes noted at *post-mortem* examination comprise, pallor, icterus of varying degrees, an enlarged black spleen and prominent red marrow.

The condition arises from iso-immunisation of the dam by a foetal red cell antigen. This antigen is analogous to the Rhesus factor of man and is present on or in the red cell. Governing its appearance are the genes for the antigen termed, by the author, R and r. R is dominant and therefore any horse with the R gene will possess the R antigen on its red cells, *i.e.*, it will be "Rhesus positive." The presence or absence of the R antigen in any horse will be dependent upon the genes it receives from its dam and sire. For haemolytic disease to appear the dam must be "Rhesus" negative and therefore of the genotype rr and the sire must be "Rhesus" positive, *i.e.*, have a genotype of either RR or Rr. If the "Rh" negative mare carries an "Rh" positive foal, the antigen on the foetal red cells crosses the placental barrier and stimulates the formation of antibodies against itself in the serum of the dam. In man these antibodies cross over from the maternal into the foetal circulation and react with the antigen in the foetal red cells. In the horse, however, it is stated that the antibodies do not cross the placenta [possible explanations are suggested], but are concentrated in the colostrum. If the foal is allowed to suckle it absorbs a large amount of harmful antibody, which damages the red cells.

It is stated that there are two types of antibody concerned, termed "complete" and "incomplete" antibody. The complete antibody is capable of causing direct agglutination of the foal's erythrocytes, whereas the "incomplete" antibody requires the presence of conglutinin. The methods used to detect these antibodies are described briefly.

Treatment is based on the principle of removing as much of the harmful antibody as possible from the circulation of the affected foal. This is done by removal of some of the foal's blood and replacing it with compatible donor's blood.

A panel of such donors has been selected and is maintained at Newmarket. Prevention of the condition may be attempted by testing the sera of suspected mares during pregnancy; if the antibody titre rises as parturition approaches, arrangements should be made to prevent the foal suckling during the first 36 hours after birth. During this time the dam should be milked at frequent intervals. Foals which are prevented from suckling are very liable to bacterial infection and this should be guarded against by the use of antibiotics.

A. R. J.

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[Pathogenesis of Bovine Mastitis. II.—The Pathological Alterations in Twenty-five Mammary Glands. SPENCER, G. R., & MCNUTT, S. H. (1950.) *Amer. J. vet. Res.* **11.** 188.]

Macroscopic and microscopic alterations in the mammary glands of twenty-five cows, mostly showing chronic mastitis, were correlated with *ante-mortem* clinical and laboratory data and with the results of *post-mortem* bacteriological examination.

In the cases of acute mastitis there were diffuse exudative inflammatory changes, and sometimes extensive necrosis. There were indications that the causal agent had spread rapidly through the quarter by way of the duct system, the milk channels probably being the site of primary multiplication. Bacterial proliferation and an increase in concentration of inflammatory irritants were favoured by occlusion of medium and small ducts by masses of fibrin, leucocytes and organisms, aided by inflammatory oedema of the interstitial tissue surrounding these ducts.

In the cases of chronic streptococcal mastitis, the inflammatory changes showed a scattered focal distribution, the foci varying greatly in size, and appearing to have been formed at irregular intervals, lesions of acute inflammation being present in most quarters that showed mainly long-standing changes. The ventral portions of the quarters were more severely affected, with much atrophy and fibrosis, probably due to the more constant exposure of this region to streptococci released into the milk channels from active foci. Partial or complete blockage of small ducts by fibrin clots, which were occasionally partly or completely organised, as well as roughening or pocketing of the epithelium of the milk ducts due to hyperplasia, might aid infection by hindering the flushing action of the milk in removing organisms at milking time.

Definite macroscopic abnormalities could be accounted for by microscopic examination in all but one case, but, on the other hand, many quarters that appeared macroscopically normal showed microscopic lesions, and most of the clinically normal animals that were eliminating streptococci in their milk showed focal histological lesions, mostly very small, of acute or chronic mastitis.

E. C.

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[An Investigation of Pleuropneumonia-like Organisms Isolated from the Bovine Genital Tract. EDWARD, O. G. FF. (1950.) *Gen. Microbiol.* **4.** 4.]

Several strains of pleuro-pneumonia-like organisms were isolated from the genital tracts of cattle. These were divided into two main groups, which the author called P and S, the former requiring serum for growth, the latter growing well without it. The S strains resembled the saprophytic members of the pleuropneumonia group, to which they are serologically related, in their ability to grow at room temperature. They were antigenically distinct from the P strains and were regarded as commensals or contaminants.

All P strains had a characteristic appearance on horse serum media, due to the precipitation of a substance, probably protein in nature. This provided an aid to identification. Strains varied antigenically, although common antigens were sometimes shared. Antisera against three different serological types were prepared in rabbits.

Agglutinins for P strains were not found in sera of infected cattle, but this was not taken to mean that the organisms were not pathogenic.

The author reports finding one strain in the semen of a stock bull with a good breeding history. This organism was later proved to be of the harmless S type.

In another case strains were found in the semen of two bulls in a herd in which there were breeding difficulties, apparently infective in origin. In these two samples no other pathogenic bacteria could be found. Each sample was inoculated into the uterus of a healthy maiden heifer at oestrus. One sample containing the P organism produced inflammation of the genital tract in the inoculated heifer; the other sample, containing the S organism, produced no ill-effect.

I. W. J.

BRITISH HONDURAS LIVESTOCK DEVELOPMENT SCHEME

British Honduras is at present dependent for the bulk of its foodstuffs, such as cattle, chilled and processed meat, butter, cheese, milk, poultry and eggs, on imports which are mainly from the dollar areas. In order to assist the colony's internal economy and make it self-supporting as regards these essential foods the Colonial Development Corporation propose to undertake a livestock development scheme comprising a cattle ranch and breeding station of about 40,000 acres and a sheep farm of 30,000 acres. A 20,000 acre arable farm will be used as a cattle fattening centre and will also support a dairy, together with pig, poultry and vegetable production.

It is planned to build up the ranch cattle gradually to approximately 11,000 head, which will allow for an annual draw of some 3,300 beasts. If this total cannot be absorbed in British Honduras the exportable surplus will be shipped to the nearby markets such as Jamaica and Cuba.

It is intended to introduce wool-growing sheep into the colony in place of the present hair-producing types, and by the time a flock has been built up to some 15,000 head the wool should form a useful dollar earner.

On the arable land, intensive crop production should provide sufficient fodder for all the livestock. As the raising of livestock on this scale in British Honduras is in the nature of a new undertaking each stage will be proved during the gradual expansion of the scheme, which is planned to take some seven to ten years, at a cost of £577,000.

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MYXOMATOSIS VIRUS EXTERMINATION OF RABBITS

The Canberra correspondent of *The Times* reports that successful experiments have now been made in the infection of rabbits with the myxomatosis virus, which has been tried at intervals since 1935 with disappointing results. Along the Murray river and tributaries where mosquitoes act as carriers, thousands of rabbits have been exterminated and the virus is expected to spread quickly during the next few weeks. The virus has been carried as far as 18 miles from the river.

Dr. Ian Clunies-Ross, Chairman of the Commonwealth scientific industrial research organisation which is conducting the experiments, says it is not impossible that the distribution of the disease will be almost continuous in the Murray valley before the end of the summer, but the virus could not be regarded as a general solution of the rabbit problem because experiments showed that the virus spreads only in areas near watercourses with the aid of mosquitoes.

IN PARLIAMENT

Commons Adjournment Debate on Fowl Pest Control

On the motion for the adjournment of the House of Commons on Friday of last week, Mr. Dye raised the question of the Control of Fowl Pest in the following terms:

The problem of fowl pest is very important to our agricultural industry because of the losses that have already been inflicted and its potential danger to the poultry industry. I find that whereas in June, 1939, we had a total of 74,000,000 poultry in this country, that number had risen to 95,000,000 by June, 1949. By June, 1950, the further increase had been very small, and the figure still stood at just over 95,000,000, indicating that there had been a halt to the rapid rise in the number of poultry in the country. That has been due to, among other things, the incidence of fowl pest disease which is prevalent in the country.

The country was benefiting by the increase in the number of poultry, because if one compares the number of eggs that have been produced with the pre-war figures, one finds that imported shell eggs in 1938 averaged 23,000,000 dozen per month whereas the average in 1950 was only 14,000,000 dozen per month. Yet the average consumption of shell eggs over the period 1934-38 was 12,000,000 dozen per week compared with a consumption of shell eggs in 1950 of 14,000,000 dozen per week, of which three-quarters were home produced. Thus there had been a change-over to the extent that the home poultry keepers were now bearing three-quarters of the burden of supplying our people with a greater quantity of eggs than were consumed pre-war.

This disease is bound to bring a fall both in egg production and table poultry in 1951, and unless this disease can be overcome very soon it will have a profound effect on our home-produced supplies. Therefore, the matter is one of extreme urgency. The reason I raise it this afternoon is because I do not feel that this House has so far given the attention it ought to have given to this very important problem.

It was shown in Question and answer just over a week ago in this House that the supplies of dead poultry from countries where fowl pest exists rose from 6,764 tons in 1949 to 8,050 tons in 1950. That is to say, in a period while we had fowl pest in this country, the number of poultry which were being imported had risen, and beyond any doubt the disease originated in this country as a result of imported poultry. Yet during 1950 we continued to import still greater quantities. What do these 8,000-odd tons of poultry mean in this country's supplies? They represent just over 6 per cent. of our total table poultry. But the damage which will be done to our own production of poultry this year will far exceed the quantity that has been imported in this way.

Therefore, I ask the Minister whether he can decide now to cease the import of table poultry from all countries where this disease exists, side by side with the most stringent efforts to stamp out the disease in this country. I was extremely disappointed to learn from the Minister of Agriculture the other day that as late as January 23rd this year a case of fowl pest in Birmingham was traced back to imported birds. This is a disease which spreads so very easily and is carried by dead poultry as well as probably by some other birds. Therefore, we have this problem with us.

I have a few notes from the Animal Health Trust which throw some more light on this problem. They say:—

"A breakdown of the outbreaks during 1947-48 in this country shows that over 60 per cent. could be plotted within 20 miles of six industrial areas, regions where these imported carcases were most likely to be distributed. Some 33 per cent. of the outbreaks showed a history of feeding on potentially infected swill; 42 per cent. originated from traffic in live poultry through auction markets and dealers. Less than 8 per cent. occurred by local spread. In other words, once the disease was established in the country by the feeding of infected swill the further spread was from movement of livestock."

We are all hoping that the Government's effort to stamp out this disease will succeed. But consider what happened in Australia. Here again I am reading from the notes which have been supplied to me.

"At the discussion on Newcastle disease at the International Veterinary Congress last year a veterinary surgeon from Australia said that after the disease had been eradicated from the country by slaughter and by a complete ban on importation, a further outbreak occurred six months later when birds had been held in cold storage for over six months and were released for the market."

There is a need not merely to ban the import of birds but to recognise that for a considerable period there should be no more coming into the country if we want to maintain a poultry industry in this country. If the industry is worth saving from the point of view of food production, then beyond any doubt the poultry keepers of this country are willing to put up with any restrictions which will have the effect of stamping out the disease. Therefore, I ask the Government to take the strongest possible measures, to face this problem fairly and squarely, and ban the imports which are found to be dangerous to us. The amount involved compared with our potential production at home is so small.

The second outbreak of disease that came to the country was of a different character and seems to have originated from birds brought in from America to supply American forces here. This may be a less deadly type of disease, but, since last October, it has wiped out some of our finest flocks of poultry. Surely we must have a definite understanding with our allies and friends who are in our midst so that they do not become the greatest enemy to our food production?

I ask the Government what communications they have had with the American Government with a view to control over the supplies of poultry sent to their troops stationed here. This is a vital matter. We may have an element of control over the camps and over the swill, refuse or surplus that goes out of the camps into the surrounding country, but, having had this heavy attack of fowl pest in the Eastern counties, and having seen it spread to other parts of the country, we cannot be too careful in the measures we take with a view to stamping out the disease.

I mentioned the question of marketing. The marketing system itself has been a danger to the poultry industry, and I ask my hon. Friend whether it is not time that the Government took steps, in consultation with representatives of the poultry industry, so that we can have urgent measures adopted to improve our system of marketing poultry. I know there have been restrictions, but even these can have adverse effects in the way in which poultry are killed for the local markets.

So I ask the Parliamentary Secretary if, in replying, he can give the poultry industry to-day fresh hope to withstand any severe restrictions placed upon it and also that it will be able to continue to provide this country with greater quantities of eggs and table birds in future.

Brigadier Medlicott: I intervene only for a moment to support the hon. Member for Norfolk, South-West (Mr. Dye) in stressing the urgency of this problem, and I am sure that we are all grateful to him for having raised it at this time.

I want to make a protest however. On January 13th, following upon a meeting with representatives of the poultry industry in Norfolk, a group of Norfolk hon. Members wrote a very carefully reasoned letter to the Minister of Agriculture, asking to be allowed to see him in view of the great urgency of this problem. For reasons best known to himself, the Minister would not see us. This week, the Minister, apparently without any difficulty and through his Parliamentary Secretary, has received a deputation from Suffolk, although it is true that there were two hon. Members from Norfolk present who had been invited by the courtesy of the hon. Member for Lowestoft (Mr. Edward Evans).

I have no wish to make any point as between one county and another, nor is there any question of hurt feelings; the problem is too serious for that. I do suggest, however, that Norfolk has been particularly hard hit by this outbreak of fowl pest, and, since it has been possible for the Minister to see one group of hon. Members this week, I confess I am rather disappointed that the right hon. Gentleman could not see the Norfolk representatives when we raised the matter nearly a month ago. If the fact that the Minister has seen a deputation this week is proof that he realises the increasing urgency and seriousness of the matter, then I make no further complaint.

I want to make two other short points. I would underline the appeal made by the hon. Member for Norfolk, South-West, on the desirability of stopping imports from abroad as long as this disease continues here. There is no doubt whatever that the poultry industry are not asking for this through any selfish motives or through fear of foreign competition. They are only concerned with stamping out the disease in this country, and that is proved by the fact that they have not only expressed themselves as being willing to submit to restrictions of the most drastic kind, but have themselves actively suggested the restrictions which they consider the Minister ought to impose upon them. So much for the short-term policy, and I hope that the Minister is going to tell us something decisive about it to-day.

The other matter which has apparently not been given quite as much attention as it deserves, is the need for long-term research with a view to finding out the causes of this disease, and perhaps, finally eradicating it. I hope the Minister will be able to tell us that not only money but the best brains are being applied to the problem of eradicating the disease by every means in our power.

Mr. Nugent: I share the great anxiety of the hon. Member for Norfolk, South-West (Mr. Dye) about the incidence of this disease,

and I think I can inform the House straight away that its incidence commences with the importation of diseased carcases. The right way to prevent the disease is to stop importing poultry. There is no other satisfactory treatment.

There are two points which I wish to raise. The first is, as the Minister knows, that the farmers throughout the country are co-operating wholeheartedly with the slaughter policy, and I think this House should record its appreciation of that co-operation. It is quite true that there is fair and reasonable compensation for flocks that are slaughtered, but that does not compensate the farmer, first of all, for loss of profits until he can get going again, which may take several months or even longer; nor does it compensate him for the loss of breeding stocks, on the building-up of which he may have spent a lifetime. As the Minister knows, some very valuable breeding stocks have had to be slaughtered in this way, and it has been a terrible blow to the farmers concerned. I think it should go on record that fair as the compensation is, it cannot compensate farmers for that kind of loss.

My second point is on the question of imports. I sympathise with the Minister sitting on the Front Bench, which was rather more crowded last night when his right hon. Friend had to answer the debate on the subject of our meat supplies, and he is naturally very sensitive about having to cut them down in any way. But, on balance, I would ask him to consider whether it is really in the consumer interest or in the producer interest to make these importations. In America the incidence of this disease is very high. They lose, approximately, 30,000,000 birds a year in that country, where the disease is endemic. In this country, with about one-fifth of the poultry population, we should lose something of the order of 6,000,000 birds. If we average their cost at £3 apiece, we get something of the order of £18,000,000 worth of poultry, which is rather more than the total of diseased carcases imported at the present time.

As the Minister knows, there is much more I should like to say on the subject, but, knowing that he has already generously compressed his time in order that I might say a word or two, I do not propose to detain the House any longer. However, I hope that in looking at the whole picture, the Minister will recognise that, on balance, it is in the interest of both the consumer and the producer to stop these imports, which are the sole source of this disease.

Government Reply

The Parliamentary Secretary to the Ministry of Agriculture (Mr. George Brown): I think it would be in the interests of the House if I replied to the debate now because there are some things which I ought to say about this matter. I agree with much of what has been said about the importance to our flocks, to the health of the birds and to the supplies of poultry and eggs, of getting this disease under control, and, indeed, of getting rid of it as soon as possible. I ought to point out to the hon. and gallant Member for Norfolk, Central (Brigadier Medlicott) that the difficulty with regard to Norfolk was that I did not hear about the request, and I hope that Norfolk will realise that it was a break-down in staff work rather than a desire to be discourteous.

Turning to a review of the position at the moment, it is difficult to be sure what is now happening concerning the progress of the disease. This is the first outbreak of this type of disease, which is rather different in its nature and in its symptoms and effect from the more virulent type of fowl pest of recent years. The first outbreak of the present type was confirmed on October 5th, and perhaps because of the mild symptoms and delay in notification the build-up for dealing with it was somewhat slow. However, up to midnight last night there had been, in East Anglia and Kent, taking the two together as a group, 216 outbreaks, in the rest of England 167, and in Scotland 15, making a total of 398 outbreaks.

There was a total of four outbreaks in one week in mid-December, rising to 90 in one week at the peak, about the middle of January, after which there was a decline, but I am sorry to tell the House that in the last week there have been a number of outbreaks hitherto unreported, some in Scotland and some in different parts of England, which bring the total number of outbreaks this week to 60, which is again getting on towards the peak figure. Whether these figures are due to delayed notifications or whether the disease is flaring up again is very difficult to say, but we are determined to do all that we can to get the disease under control and to deal with the cause.

We have made a Control of Movements Order, similar to the one that already applies in England and Wales, to apply to Scotland, which will operate from midnight to-night, to prevent the disease getting out of hand in Scotland by the indiscriminate movement of birds. One of the effects of the Order will be to prevent the holding of the poultry section of the dairy show, which, I understand, will open at Glasgow next week. In view of what happened at the English poultry show in December, I think that everyone will agree that that is a wise course to take.

The very best brains that we have in the veterinary profession have been hard at work on this disease ever since it was first realised that something new was happening. We are working on long-term research, and, more important immediately, on the short-term job of getting the disease under control and isolated. It seems reasonable to assume—and there is some circumstantial evidence—that this new outbreak had its origin in American camps in East Anglia. The American authorities have been most co-operative in discussing ways and means of disposing of the birds in a way which would not spread the disease, and quickly agreed to put into operation arrangements which we were able to approve.

I am happy to tell the House that, following further discussions, the American authorities have now agreed to prohibit the import of poultry for their camps from America because of the likelihood of bringing in the disease. It will take a little while before we can operate the ban because they have to make arrangements to replace these supplies from other sources, but that is being done as quickly as possible and I am sure that the House will pay the highest tribute to the Americans for their sincere understanding of the problem.

Mr. Edgar Granville: On the question of swill in the American camps, is the Parliamentary Secretary satisfied that this will apply to all American camps and that the discipline will be completely effective?

Mr. Brown: If they are not to bring in any more, the point becomes a little academic, but so long as there is swill to dispose of we are satisfied with their willingness to co-operate and put the regulations into effect and to deal with any breach of them. They have given all the co-operation and assurances that we could want in this respect.

I ought now to turn to the question of imports, apart from the American imports. I have the greatest sympathy with the desire to end imports which might run the risk of bringing the disease into this country, but we have to remember that things are seldom black or white and that we have to balance the position. Not only are we discussing this question against the background of an 8d. ration of meat, but from the point of view that importations from the Continent, where the disease is prevalent, represent about 50 per cent. of our total imported supplies during the three months of the year about Christmas-time. Although it is a small percentage compared with the whole year, it is a large percentage at this time of the year. Discussions are going on between the interested Government Departments, and I can assure the House that we are all aware of the problem and anxious to get a decision very soon. I hope that we shall be able to announce a decision in the course of a month.

It is not a fact that we are destroying more birds than we can import. We must get the matter into perspective. The figures show that between 1947 and 1950 something like 400,000 birds—roughly, 1,000 tons—were slaughtered. In addition, a number of birds died from the disease, but even if these losses are put at the outside figure of 50 per cent. the total loss is not more than 1,500 tons, whereas our imports from these countries during the same period were some 27,000 tons. We have to take into consideration the shutting out of 27,000 tons for a loss of the order of something like 1,500 tons during the same period

Mr. Nugent: My point was on the loss we should experience if the disease became endemic.

Mr. Brown: I concede the point the hon. Member has in mind. I am pointing out that there is another side to this matter to be considered.

I can assure the House that we appreciate the seriousness of the position, and that so far as the immediate outbreak is concerned we are doing all we can, by the veterinary services and by administrative work, to bring it under control. We shall continue the slaughter compensation policy so long as it seems likely that we shall get it under control, and whether we can do that or not largely rests in the hands of the poultry keepers themselves. So long as the poultry keepers report all outbreaks, giving us time to get to work, there is every hope that we shall get this under control. We shall consider the import policy as vigorously and as quickly as we can. I hope that what I have said about American importations will lead the House to think that the possible source of the outbreak has also been covered.

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Questions

Fowl Pest

Mr. Baker (February 5th) asked the Minister of Agriculture if he will now reverse his decision not to stop the importation of all

poultry, live or dead, in view of the increase of fowl pest and the necessity for combining a ban on imports with the slaughter policy, if it is to be fully effective.

Mr. T. Williams: The importation of live poultry from countries where fowl pest is prevalent is already prohibited. As regards poultry carcases, I cannot at present add to the answer I gave to a number of Questions on January 25th.

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Horses and Ponies in Mines

Mr. Peter Freeman (February 5th) asked the Minister of Fuel and Power the number of horses and ponies employed below ground at present in the mines of each of the divisions in the United Kingdom; the number so employed five, ten, 15 and 20 years ago; and how far the tendency to do away with horses and ponies in mines is being accelerated in view of the extent of coalface and general mine mechanisation.

Mr. P. Noel-Baker: The following are the particulars asked for:—

Number of Horses Employed Below Ground at Mines*
At June 30th

——	Scottish	Northern	Durham	North Eastern	North Western
1930	1,582	4,463	13,579	6,932	766
1935	886	3,371	10,220	5,012	332
1940	631	3,247	9,812	4,263	231
1945	352	2,841	8,094	3,332	139
1950	157	2,435	6,873	2,584	59

——	East Midland	West Midland	South Western	South Eastern	Great Britain
1930	7,703	2,497	11,722	——	48,844
1935	4,591	2,076	8,744	——	35,232
1940	2,964	1,648	7,169	——	29,965
1945	1,874	1,216	5,331	12	23,191
1950	1,336	828	3,168	——	17,440

* As defined by the Coal Mines Act, 1911, but excluding the stratified ironstone mines in Cleveland, Lincolnshire and Northamptonshire.

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Horses (Transport)

Sir Jocelyn Lucas (February 8th) asked the Minister of Agriculture if his attention has been called to cases of cruelty to horses in transport to slaughter-houses by overcrowding in lorries, etc.; and if he will introduce legislation to make the employees concerned responsible for reasonable care and attention being given to the animals in question during transit as well as at other times.

Mr. T. Williams: It is already an offence under the Protection of Animals Acts for any person, by omitting to do any act, to cause any unnecessary suffering to animals, and in the case recently reported convictions were obtained against the two employees concerned. I propose to make specific provisions about overcrowding, amongst other things, in the Order which I am about to make dealing with the transit of horses by road and rail.

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Dog Licences (Convictions)

Mr. Pannell (February 8th) asked the Secretary of State for the Home Department how many convictions were obtained throughout the country, in the last ascertained period, against persons who had failed to take out licences for dogs.

Mr. Ede: The number of convictions in England and Wales in 1949 was 16,121. The provisional figure for the first eleven months of 1950 is 14,761.

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B.C.G. Vaccine

Mr. Awbery (February 8th) asked the Minister of Health if he will now take steps to permit general practitioners to inoculate with B.C.G. vaccine and to give them discretionary powers in closed cases to send an inoculated child away from home.

Mr. Marquand: Research into the use of B.C.G. in this country is still continuing, and I am advised that any general or indiscriminate distribution of the vaccine would not be prudent at present.

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Cancer

Mr. Peter Freeman (February 8th) asked the Minister of Health which of the various forms of cancer are now known to be curable, in addition to any that can be alleviated; what is the treatment adopted; and for what forms no cure has, so far, become known.

Mr. Marquand: Some types of cancer can be treated with very great hope of success if treatment is sought early. I am advised, however, that it would only be misleading to attempt to give a general answer to the various parts of the Question within the limits of a Parliamentary reply.

NOTES AND NEWS

Diary of Events

Feb. 17th.—Meeting of the Biochemical Society in the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1, 11 a.m.

Feb. 20th.—Annual General Meeting of the Eastern Counties Division, N.V.M.A., at Norwich (Bell Hotel), 11 a.m.

Feb. 21st.—Annual General Meeting of the Scottish Metropolitan Division, N.V.M.A., at the Royal (Dick) Veterinary College, Edinburgh, 2.15 p.m.

Feb. 21st.—Royal Society of Medicine, Section of Comparative Medicine: Laboratory Meeting at the Royal Veterinary College, Camden Town, N.W.1, 4 p.m.

Feb. 21st.—Meeting of the West of Scotland Division, N.V.M.A., Clinical Club, in the Glasgow Veterinary School, 7.30 p.m.

Feb. 22nd.—Annual General Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 2.30 p.m.

Feb. 23rd.—Liverpool University Veterinary Society's Annual Ball.

Feb. 23rd.—Annual General Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

Feb. 23rd.—Glasgow University Veterinary Medical Association Annual Ball, in the Ca'dora Ballroom, Glasgow.

Feb. 23rd.—Meeting of the Sussex Division, N.V.M.A., at Horsham (The Black Horse Hotel), 2.30 p.m.

Feb. 27th.—Meeting of the Society of Women Veterinary Surgeons at the Royal Veterinary College, N.W.1, 6 p.m.

Mar. 1st.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton.

Mar. 1st.—Annual General Meeting of the British Society of Animal Production, in the Lecture Room, Zoological Society of London, Regent's Park, 11.15 a.m.

Mar. 8th.—Meeting of the East Midlands Division, N.V.M.A., at Sutton Bonington, 2.15 p.m.

Apr. 9th and 10th.—Annual Congress of the Laboratory Animals Bureau, in the University of Liverpool.

Sept. 23rd-29th.—Sixty-ninth Annual General Meeting and Congress of the National Veterinary Medical Association, at Eastbourne.

QUARTERLY MEETINGS OF COUNCIL AND STANDING COMMITTEES N.V.M.A. DURING 1951

The following dates are given for remaining meetings this year, chiefly to give members plenty of time to reserve hotel accommodation.

In London

Monday, April 16th:
2 p.m. Organising Committee
4 p.m Parliamentary and Public Relations Committee.

Tuesday, April 17th:
10 a.m. Veterinary State Medicine Committee.
12 noon Home Appointments Committee.
2.15 p.m. General Purposes and Finance Committee.

Wednesday, April 18th:
11 a.m. Council

In Edinburgh

Wednesday, July 11th:
11 a.m. Home Appointments Committee.
2 p.m Organising Committee.
4 p.m. Parliamentary and Public Relations Committee.

Thursday, July 12th:
11 a.m. Veterinary State Medicine Committee.
2 p.m. General Purposes and Finance Committee.

Friday, July 13th:
11 a.m. Council.

Dishorning of Cattle

The Technical Development Committee of the Association has under review methods of dishorning cattle, and is particularly anxious to secure information on methods used in practice.

Dishorning by the Rubber Ligature Method

Information is required, particularly, on methods of dishorning using rubber bands or ligatures, with special reference to (*a*) technique used, (*b*) pain involved during the whole process of the removal of the horn, and (*c*) reliability in effecting removal of the horn, and length of time taken.

It would assist the Committee greatly if members would respond promptly to this appeal for information by writing on the subject to the General Secretary, N.V.M.A., 36, Gordon Square, London, W.C.1. It would be much appreciated if letters could be received not later than February 24th, 1951.

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Motor-cars—Running Costs

The N.V.M.A. desires to obtain from as many members of the profession as possible reliable figures regarding the running costs of the motor-cars in use by them, with the object of bringing the Association's information more up to date and to assist it in making representations with regard to the mileage allowance to veterinary surgeons for official work, should such representations be necessary. (Figures which have been worked out by accountants would be particularly valuable.)

Members of the profession are therefore invited to furnish the General Secretary, N.V.M.A., 36, Gordon Square, London, W.C.1, with the following information:—

The estimated cost per mile of running a car in veterinary practice, with particular reference to horse-power.

It would assist the Association further if this cost could be analysed and the following information given:—

(*a*) Initial cost of car and amount set aside for annual depreciation.

(*b*) Horse-power tax and insurance.

(*c*) Annual repair expenses.*

(*d*) Expenditure on tyres.

(*e*) Expenditure on petrol and oil.

(*f*) Total annual mileage and average mileage per gallon.

* Where cars exceeding two years of age are in use comparative repair bills with cars less than two years of age would be of value.

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PERSONAL

Appointments in the Faculty of Veterinary Science, University of Queensland

The Faculty of Veterinary Science in the University of Queensland recently has been re-formed and the full five-year course is now being given. In the interest of promoting the highly desirable linkage between the veterinary schools of the Commonwealth, we have pleasure in publishing the following, received from Dr. T. K. Ewer, Dean of the Veterinary School.

The appointment is announced of Mr. Ramsay Millar, M.R.C.V.S., to the post of Senior Lecturer in Clinical Medicine in the Faculty of Veterinary Science, University of Queensland.

Mr. Millar qualified at the Royal Veterinary College in 1934, winning three medals in clinical medicine. After two years working as an assistant in various practices, he was granted a commission in the R.A.V.C. He later relinquished this to take up partnership in his father's practice in Bishop Stortford. Upon his father's death in 1939, he took over the entire control of the practice, including the veterinary supervision of the Hon. Miss Dorothy Paget's thoroughbred stud at Elsenham, Essex, which in 1943 was the leading stud in Great Britain. In 1950 he travelled to Australia to take up a position as Veterinary Surgeon and Advisor to the Pines Stud, Dandenong, Melbourne.

The appointment in the same Faculty also is announced of Dr. Richard Tucker, D.V.M, to the post of Assistant Lecturer in Histology and Embryology.

Dr. Tucker was educated at Lublin, Poland, and after completing his leaving certificate in 1932, served in the Army Engineering School, and graduated as a second lieutenant the following year. He at once enrolled in the Veterinary Faculty of the University of Warsaw, graduating Bachelor of Veterinary Medicine in 1938. He was appointed an assistant lecturer, and until the invasion of Poland was also engaged in research work in the fields of mammalian craniology and biomechanics.

Dr. Tucker was called up at the beginning of the war and served with the Army Engineers until he was made a prisoner of war in Germany at the end of 1939. He remained in captivity until 1945, but later was able to continue with his osteology research work as well as to take part in lecture courses to fellow prisoners of war. After the war he lectured at the Technical University of Regenburg, and at the UNRRA University in Munich. In 1948 he was awarded a Doctorate of Veterinary Medicine in the latter University for a thesis dealing with the relation between structure, function and environment in the skulls of mammals. He came to Australia with his wife and children in February of last year.

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Birth.—King.—On February 5th, 1951, to Helen, wife of J. O. L. King, a son.

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Death.—Atkinson.—At the Royal Devon and Exeter Hospital on February 7th, Valerie Mary, daughter of Mr. G. Atkinson, M.R.C.V.S., and Mrs. Atkinson, of Prestwood, Matford Avenue, Exeter

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Forthcoming Marriage.—Rayne—Coate.—The engagement is announced between Philip Rayne, M.R.C.V.S., only son of Mr. and Mrs. J. E. Rayne, of Plymouth, Devon, and Pamela Coate, only daughter of Mr. and Mrs. C. H. Coate, of Langport, Somerset.

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Conferment of University of London Degrees.—At a Presentation Ceremony held at the Senate House on February 2nd, the Vice-Chancellor conferred the degree of Doctor of Science on Mr. S. J. Edwards, M.Sc., F.R.C.V.S., and the degree of Doctor of Philosophy on Mr. F. R. Bell, B.Sc., M.R.C.V.S., and on Mr. F. W. Withers, M.A., M.R.C.V.S. The three recipients are former students of the Royal Veterinary College.

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R.C.V.S. OBITUARY

Child, Ernest, Capt. late R.A.V.C. (T.F.), 10, Langdale Terrace, Kirkstall Lane, Leeds, Yorks. Graduated London, December 17th, 1900. Died January 7th, 1951; aged 73 years.

Dobie, Thomas, 3, St. Andrew's Road, Birkenhead. Graduated Glasgow, July 27th, 1885. Died February 2nd, 1951; aged 86 years.

The Late Mr. Thomas Dobie, M.R.C.V.S.

Mr. Thomas Dobie, M.R.C.V.S., whose death we record above with deep regret, was for 60 years one of Birkenhead's leading veterinary surgeons.

Mr. Dobie was educated at the former Wirral Academy and qualified at the Veterinary College in Glasgow. He returned to Birkenhead and joined his father in the family practice at Charing Cross. Founded by his father, this practice was one of the oldest in Birkenhead.

In 1938 Mr. Dobie moved from the Cross to St. Andrew's Road, and although he was then over 70, he re-opened his practice at his home, where he held surgeries until the time of his death.

Mr. Dobie was local veterinary inspector for the port of Birkenhead for many years and held appointments under the Cheshire County Council.

He leaves a widow, four children and three grandchildren, to whom deep sympathy is extended in their loss.

The funeral took place at Flaybrick Hill Cemetery on February 6th, the service being conducted by the Rev. Andrew Prentice. Mr. H. Sumner represented the Lancashire Veterinary Association.

The Late Captain Thomas M. C. Hunt, M.R.C.V.S.

An Appreciation

Tommy Hunt, as he was to a host of friends at home and abroad, was one of those very abstemious, quiet, thoughtful men who hid the light of his attainments and professional ability under a bushel. Nevertheless, he was good company and welcome wherever he went. He had a good light baritone voice and when offered a contract by the Metropolitan Opera Company he rejected it, in face of the

strongest arguments I advanced in favour of his accepting it, because it meant—publicity. He was keen on all outdoor sports, and particularly good at cricket and footba l. His hobbies were his profession, singing, his horses and colouring his Meerschaum pipes.

After finishing his education at Bedford College he entered our profess on, and soon after qualifying he joined the old-established family of veterinary surgeons, Messrs. Batt & Sons, Oxford Street, London, who in later years expressed to me their high opinion of him as a man and of his professional ability.

He joined up at the outbreak of the Boer War and was sent to New Orleans to jo n the veterinary staff engaged in remount work. Almost immediately after his departure I received a wire from the War Office ordering me to Texas to purchase horses, and to report at St. Charles Hotel, New Orleans, *en route*. On arrival I found my friend Professor Owen Williams ("Young Billy" to the students at the New College) in a poor state of health and his "right-hand man," Hunt, also ill. I acted as Williams' deputy and at his request went to Hunt's room, where I found him with a bad attack of malaria. That was our first meeting and we took to each other like ducks to water. During over 51 years of our friendship not a cross word passed between us. Inspection of the depot showed that no improvement could be made in the arrangements, for which Hunt was chiefly responsible. As Williams cou'd not stand the climate he was invalided home. Eventually Hunt took over contro! and under his charge the mortality in horses shipped was less than one in 1,000. At the end of the war it was generally expected that Hunt's good work would be recognised in a suitable manner: not a bit of it.

Shortly after his return to England he entered into partnership with a friend at Twickenham. That was a failure, so Hunt started practice at Cho'sey, Berks. It soon assumed such dimensions that it was more convenient to move to Wallingford. At the outbreak of World War I he was again ordered to New Orleans as Chief V.O., carry ng out his work with eminent success. When New Orleans was closed he was sent to the shipping of horses and mules from the Eastern ports of the U.S.A., with similar results. On some occasions senior officers attempted to improve on his methods, but before the day was out there was chaos, and they were glad to retire and let Hunt carry on in his own way. Once more it was expected that his work would be rewarded, but, to the best of my knowledge, it was not recognised. As I was also on duty there I had plenty of opportunity to judge, and expressed my views without restriction to the Director on my return to England.

Hunt resumed his practice at Wallingford until it was purchased by the Royal Veterinary College, after which he devoted himself to his daughter, taught her to ride and encouraged her in her equestrienne ventures, and his latter years brought happiness to compensate him for much unhappiness and tragedy in his life. How deep were the wounds I alone know.

He was a sound practitioner, played the game with his colleagues in the districts around him and had not the least desire to make an extensive practice at their expense.

At all the North American ports he was he'd in high esteem by those connected with shipping, and in World War II when I was on duty—I know all the North American ports—some of the old timers enquired after him in respectful and even affectionate terms, which made me proud of our friendship.

REG. F. WALL.

[Captain Hunt's death was recorded in our issue of January 13th. —*Editor.*]

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B.M.A. AND S. AFRICAN ASSOCIATION

Participation in Joint Meeting Refused

A firm stand against the intrusion of racial discrimination into the essential doctrine of the freedom of medicine has been taken by the Council of the British Medical Association, which at its meeting on Wednesday of last week passed the following resolution:—

"As an assurance cannot be given that all members of the British Medical Association will be free to enter South Africa for the proposed joint meeting of the Medical Association of South Africa and the British Medical Association, which they had agreed to hold in Johannesburg next July, the Council of the British Medical Association greatly regrets that it cannot now participate in the joint meeting."

The Association states that the resolution arose out of a recent report that only delegates of pure European descent would be allowed by the South African Government to enter the Union to attend conferences. Subsequently, in order to clarify the position, correspondence passed between the British Medical Association and the Medical Association of South Africa.

It has not been possible to obtain an official assurance from the South African Government on this matter.

FILMS OF PARASITES OF MAN AND ANIMALS

In its issue of February 3rd, *Nature* records that the medical committee of the International Scientific Film Association has issued a preliminary list of films on human and comparative parasitology which contains information received in response to a circular sent out last March. The list includes films made in Great Britain, France, Belgium, Switzerland, Norway, Denmark, Germany, Italy, Yugoslavia, Portugal, the United States, Canada, Australia, Brazil, Uruguay, Rhodesia and the U.S.S.R. The Protozoa are represented by films of *Trypanosoma gambiense* and sleeping sickness, *Shizotrypanum cruzi* and the disease it causes in South America (Chagas's disease), *Entamoeba histolytica* and amoebic dysentery, malaria and its control in Sardinia and in general, and *Lankesterella* (listed as a Haemogregarine) and *Balantidium coli*. Flukes are represented by *Opisthorchis felineus, Schistosoma, Fasciola hepatica* and some other species. Tapeworms appear in films of the development of the human fish-tapeworm (*Diphyllobothrium latum*) and of hydatid cysts of the lung, and in one on the operation for the removal of hydatid cysts. The roundworms filmed are *Strongyloides*, hookworms, *Loa loa, Trichinella, Ascaris*, stomachworms of sheep, the human threadworm and filarial worms. Films on insects include the housefly and the blowfly, the control of these, and mosquitoes, and there is one on the biology of the tsetse fly, *Glossina palpalis*. Other insects filmed are the bed-bug, human lice (which also appear in films dealing with the control of typhus in Naples and elsewhere) and the Congo, and the floor maggot of *Auchmeromyia*. Arachnids are represented by *Sarcoptes scabiei* and the ticks concerned in the transmission of Rocky Mountain spotted fever, which appear in a film on the preparation of a vaccine against this fever. Other subjects dealt with are the technique of making blood films, the diagnosis of human threadworm infection, the development of the chick embryo, *Treponema pallidum*, syphilis, and avian and other spirochaetes. There are also films on dengue fever, the control of plague, the locomotor apparatus of bacteria and tissue culture. The committee hopes to receive additions to this preliminary list and corrections of it, so that it may compile a permanent catalogue and may issue periodical supplements to it. The address of the committee is 231 Péristyle Montpensier, Paris, 1, and the letter accompanying the list comes from Dr. Willem de Vogel, c/o Universitaire Film, Catharijnesingel 59, Utrecht.

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WEST AFRICAN INSTITUTE FOR TRYPANOSOMIAS.S RESEARCH

Sir John Macpherson, Governor of Nigeria, opened the West African Institute for Trypanosomiasis Research on January 31st. The Institute (states *Nature* in a recent issue), which is partly at Kaduna and partly at Vom, will undertake further research into all aspects of human and animal trypanosomiasis, including studies on the insect carriers of this group of diseases and experimental work with the various trypanocidal drugs. It will maintain a central library and museum, and serve as an information and advice bureau on all problems connected with sleeping sickness and animal trypanosomiasis. The cost of the Institute, £234,000, has been met under the Colonial Development and Welfare Acts, which have borne two-thirds of it, and the remainder by the Governments of Nigeria, the Gold Coast, Sierra Leone and the Gambia. Colonel H. W. Mulligan, of the Indian Medical Service, formerly director of the Central Research Institute, Kasauli, was appointed Director of the Institute in 1947, and he has been responsible for acquiring sites and preparing plans for administrative, laboratory and ancillary buildings as well as for the other tasks of organisation involved in starting an entirely new research institute. It is expected that men of science from other countries will visit the Institute as guest workers from time to time. The affairs of the Institute are in the hands of a statutory managing committee of which the Chief Secretary of the West African Council is chairman, and on which the director of the Institute also sits; the various members are nominated by the West African Governments, while the director and chairman are appointed by the Secretary of State.

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NIGERIAN LIVESTOCK INDUSTRY

The Nigerian Livestock Mission, in their recently issued report, express their conviction that a livestock industry of considerable size can, in course of time, be developed in Nigeria, and that the industry can produce at such prices as will enable it to sustain an important export trade. "Her breeds of cattle, her vast undeveloped tracts of potentially good cattle land, the possibilities she

has of growing relatively cheap corn, her port facilities, and her nearness to Great Britain are all points in her favour." In making their recommendations the mission "have sought to build on a Nigerian foundation of self-help, self-respect, and self-determination." They estimate the present cattle population of Nigeria to be some 7,000,000 or 8,000,000, and express the view that, properly farmed, the land could carry several times this number.

Slaughtering methods and methods of moving cattle are severely criticised. From the point of production to the point of slaughter cattle move "on the hoof" along prescribed trade routes, of which there are 13,000 miles. There was "phenomenal wastage in weight and quality while undergoing a trek of from 20 to 60 days under tropical conditions." Losses under conditions of rail transport were not nearly so great.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Yorks (*W.R.*).—Butter Haw Farm, Gargrave, Skipton, Yorkshire (Feb. 5th).

SWINE FEVER:

Ayr.—St. Mary's Holm Piggery, Galston (Feb. 9th); Dalry Road Piggeries, Dalry Road, Ardrossan (Feb. 10th).

E. Lothian.—No. 4 Holding, Campton Drem (Feb. 5th).

Essex.—Searchlight Farm, School Lane, Kelvedon Common (Feb. 6th).

Lanarks.—Halfacre Park, Carfin Road, Craigneur (Feb. 7th). Philipshill Piggery, Philipshill, Busby; Hyndshaw Farm, Carluke (Feb. 8th).

Lincs (*Lindsey*).—Carr Side, Epworth, Doncaster (Feb. 9th).

Norfolk.—Gresham Farm, Pulham Market, Diss (Feb. 5th); Kelling Sanatorium, Holt (Feb. 6th).

Notts.—Campbell House, Shelford Road, Radcliffe-on-Trent (Feb. 6th).; Hall Barn Lane, off Abbott Road, Mansfield (Feb. 7th).

Stirling.—Glenhead Farm, Castlecary, By Boonie Bridge (Feb. 8th).

Sussex, E.—Twineham Place Farm, Twineham, Haywood Heath (Feb. 9th).

Warwick.—Laburnum Farm, Waste Lane, Balsall Common, Coventry (Feb. 6th).

Yorks (*E.R.*)—Ashby House, Ellerker (Feb. 7th); Grove Terrace, Langton Road, Norton (Feb. 9th).

Yorks (*N.R.*).—Morton-on-Swale, Northallerton (Feb. 10th).

Yorks (*W.R.*).—Crooks Farm, North Leighton (Feb. 6th); Lea Croft, Lee Green, Mirfield; Manor Farm, Grimesthorpe Road, Sheffield; 103, Clark Lane Allotments, Leeds, 9; Sloethorne Farm, Little Ouseburn, York (Feb. 9th); Manor Cottage Farm, Manor Lane, Sheffield (Feb. 10th).

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Erratum.—"The occurrence of ketosis in pregnant ewes, associated with parasitism" (*Vet. Rec.* **63**, 40. col. 1, para. 3, l. 12: for *Dictyocaulus viviparus* read *Dictyocaulus filaria*. The authors (K. C. Sellers and P. D. S. Pugh) regret their erroneous reference to the finding of the former worm in the sheep.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

ACETONAEMIA

Sir,—Further correspondence can scarcely add to the confusion existing regarding acetonaemia. It now seems that "the fires of carbohydrate" formerly used for the combustion of fat, are rapidly being extinguished, and when acetonaemia occurs in traumatic gastritis, tuberculosis, subacute metritis and in apparently healthy animals, it differs from the ketosis arising *post-partum*. This latter condition is now considered a function of the sadly over-wrought pituitary glands. As multiple as the aetiology is the treatment. Injections of magnesium sulphate, calcium salts, adenosine-triphosphate and formalin, are apparently as effective as drenches of treacle, chloral hydrate, minerals and various recipes for stomach mixtures. Viewing this Hydra, the practitioner must decide whether the condition is a clinical subject, or an exercise for the imagination of the biochemist.

Since the aim of treatment is the alteration (or the influencing) of cell metabolism from a morbid to a healthy state, it is helpful to know something of cell metabolism. Little mention has been made of basic facts, and only against this background would it be possible to assess the value of recent pronouncements. A cursory glance at the process light-heartedly called the oxidation of glucose (*i.e.*, the production by the cell of CO_2, H_2O and energy) reveals a formidable array of seven to eight enzymes and co-enzymes, some of which are related to the vitamin B complex. A closer look shows that glucose *per se* is unavailable to the cell, but must be converted to glucose-6-phosphate by adenosine-tri-phosphate and hexokinase. The phosphorylation of glucose (transfer of P. from adenosine-tri-phosphate which becomes adenosine-di-phosphate) liberates energy, equal to 1/50 the energy derived from the oxidation of 1 mol. of glucose, and is used for muscular contraction. A.T.P. is reconstructed from A.D.P. by the addition of another P. molecule to the latter, the energy in this case being absorbed and is provided by the oxidation and reduction respectively, of β-hydroxy-butyric and pyruvic acids. It is not beyond the bounds of possibility that aceto-acetic acid is used for the same purpose, nor that a disturbance in any *one* of the links of glucose utilisation in energising the cell could lead to acetonaemia. This view is strengthened by considering that many of the co-enzymes used to produce, ultimately, CO_2, H_2O and energy, are metallic compounds—Mg, Mn, Mo, Fe, Cu, amongst others. From the results of actual workers in the field, one is led to believe that a multiple aetiology exists in fact. The practitioner must, in some degree, subscribe to the "*post hoc ergo propter hoc*" attitude, however fallacious this may be to those working in the rarefied atmosphere of laboratories.

It appears, then, that effective treatments are as numerous as the possible aetiological factors. Some of these treatments are rational, but others, whose rationale is still obscure, are just as effective, as in the case of intravenous injection of formalin. This form of treatment is described as "shock treatment," but the symptoms demonstrated are compatible with the symptoms after intravenous calcium in "milk fever." Barker, in the N.V.M.A. publication on "Grassland and Animal Health," quotes that Ca and Mg are the most powerful "mobilisers" of A.T.P. This may explain why Ca and Mg injections are effective cures in acetonaemia, for Carlström cites the direct use of A.T.P. as a curative agent. Where injection of glucose is effective, one must presuppose a hypoglycaemia, since Phillipson has shown that ruminant digestion of carbohydrates results in the formation of organic acids which are absorbed as such. Incidentally, in view of the last statement, presumably one should avoid treacle *per os*, since this can only increase the acidosis already in existence without supplying any glucose directly. However, practitioners find this means effective in arresting some cases of acetonaemia. The rationale of supplying a mineral mixture is apparent from the nature of the co-enzymes of carbohydrate digestion.

Acetonaemia would seem to be a basic cellular dysfunction and it ought not to be regarded as a dysfunction of one particular organ, otherwise the unity and continuity of the organism will be destroyed. It is suggested that acetonaemia is related to ruminal digestion, but, to limit its relationship to the synthesis of milk with a reference to prolactin, seems to be inadequate, in view of the effect that Mg SO$_4$ has in increasing the butter fat content of milk, and acting as a specific in acetonaemia. One is tempted to suggest that the comparatively excessive amounts of ketones produced by the liver are in response to the increased milk flow stimulated by prolactin in a normal fashion, and that in acetonaemia, amongst other disturbances, the synthesis of butter fat, or the use of ketones as energy for this synthesis, is upset. The problem then evolves as a disturbance in all metabolism involving the cells of the fat depots, the liver, the pituitary and the mammary glands.

Yours faithfully,
J. CASSELLS.

c/o Messrs. Castle & Leason,
Black Horse Lane,
Ipswich.

WEEKLY WISDOM

It is fair to ask whether expert knowledge is not with the best of intentions, pushing us too deep into the brier-bush of unenforceable regulations.—"The Lancet."